Dell® OptiPlex® GXi Systems

SERVICE MANUAL



DELL®

Dell® OptiPlex® GXi Systems

SERVICE MANUAL

June 1997 P/N 50560 Rev. A01

Contents

Chapter 2
Basic Troubleshooting 2-1

Chapter 3
Beep Codes and Error Messages 3-1

Chapter 4
Removing and Replacing Parts on the Low-Profile Chassis 4-1

Chapter 5
Removing and Replacing Parts on the Midsize Chassis 5-1

Chapter 6
Removing and Replacing Parts on the Mini Tower Chassis 6-1

Figures

Tables

Read This First

A prerequisite for using this manual to service Dell computer systems is a basic knowledge of IBM®-compatible PCs and prior training in IBM-compatible PC troubleshooting techniques. In addition to information provided in this manual and the *User's Guide* that came with the system, Dell provides the *Diagnostics and Troubleshooting Guide* for troubleshooting procedures and instructions on using the Dell diagnostics to test the computer system.

Warnings, Cautions, and Notes

Throughout this manual, there may be blocks of text printed in bold type or in italic type. These blocks are warnings, cautions, and notes, and they are used as follows:

WARNING: A WARNING indicates the potential for bodily harm and provides instructions for how to avoid the problem.

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and provides instructions for how to avoid the problem.

NOTE: A NOTE provides helpful information about using the computer system.

Figures

Tables

Chapter 1
System Overview

The Dell® OptiPlex® GXi systems are high-speed, upgradable, desktop computers. The Dell OptiPlex GXi systems are available in three sizes: a low-profile desktop computer, a midsize desktop computer, and a mini tower computer. Chapters 1 through 3 and Appendix A contain information that applies to all models of the Dell OptiPlex GXi systems. Chapters 4, 5, and 6 are chassis-specific.

The Dell OptiPlex GXi systems use the Intel® Pentium® family of microprocessors. These Dell computers incorporate the high-performance PCI expansion bus as well as the ISA expansion bus. These buses are built into the system board, which also integrates the microprocessor, memory controller, hard-disk drive controller, video controller, and other elements of the basic computer.

The microprocessor for the OptiPlex GXi systems is installed in a ZIF socket, which allows the computer to be upgraded when faster microprocessors become available.

The Pentium microprocessor contains a built-in clock multiplier circuit, which increases the internal operating frequency to a multiple of the system clock frequency.

The microprocessors for each of these computers and their operating frequencies are as follows:

- Dell OptiPlex GXi 133 systems — 133 MHz derived from a system clock frequency of 66 MHz
- Dell OptiPlex GXi 166 systems — 166 MHz derived from a system clock frequency of 66 MHz
- Dell OptiPlex GXi 166 systems with MMX™ technology — 166 MHz derived from a system clock frequency of 66 MHz
- Dell OptiPlex GXi 200 systems — 200 MHz derived from a system clock frequency of 66 MHz
- Dell OptiPlex GXi 200 systems with MMX technology — 200 MHz derived from a system clock frequency of 66 MHz
- Dell OptiPlex GXi 233 systems with MMX technology — 233 MHz derived from a system clock frequency of 66 MHz

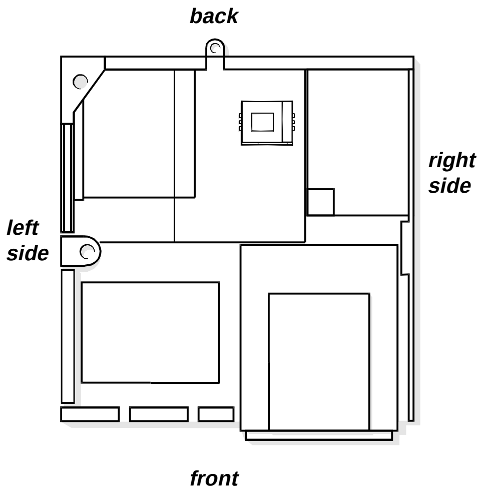
System Features

In addition to the standard features found in a traditional personal computer, the Dell OptiPlex GXi systems include the following new and/or advanced features:

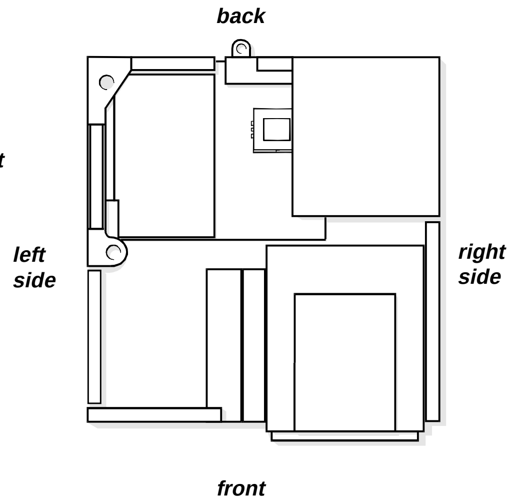
- Advanced combination ISA and PCI expansion subsystem
- Plug and Play ISA expansion-card capability
- Enhanced dual-interface EIDE subsystem
- Integrated cache memory controller that supports 256 or 512 KB of external pipeline-burst cache memory
- Main system memory consisting of 16 to 512 MB of high-speed EDO DIMMs
- ECC function when all installed DIMMs are 72-bit parity DIMMs, and the ECC category is set to On in the System Setup program
- Built-in SVGA controller attached to the PCI bus with 2-MB video memory
- Integrated 16-bit audio controller that provides all the same functions of the Sound Blaster Pro expansion card
- Integrated 10- or 100-Mb/sec Ethernet NIC
- Integrated Universal Serial Bus (USB) controller with two USB-compliant connectors
- Self-Monitoring Analysis Reporting Technology (SMART)-compliant hard-disk drives and SMART support in the system BIOS, which warns you at system start-up if a hard-disk drive has become unreliable
- New quick-test feature in the diskette-based diagnostics (for more information about Quick Test, see "Running the Diskette-Based Diagnostics" in Chapter 2).

All of these features except the new quick-test feature and the SMART support are briefly described in this chapter. For a complete list of system features, see "Technical Specifications" found later in this chapter.

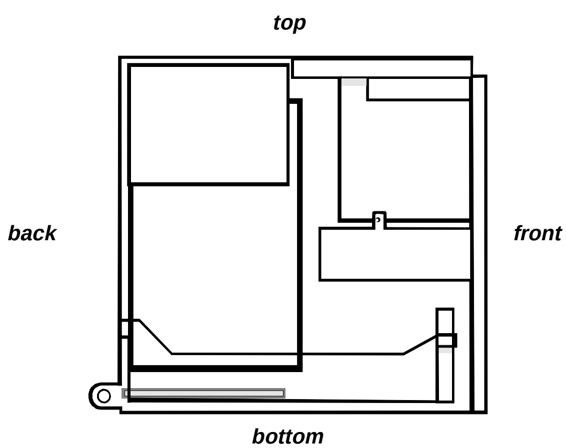
When following the text in this manual, assume that the location or direction relative to the computer is as shown in Figure 1-1.



Low-Profile Computer

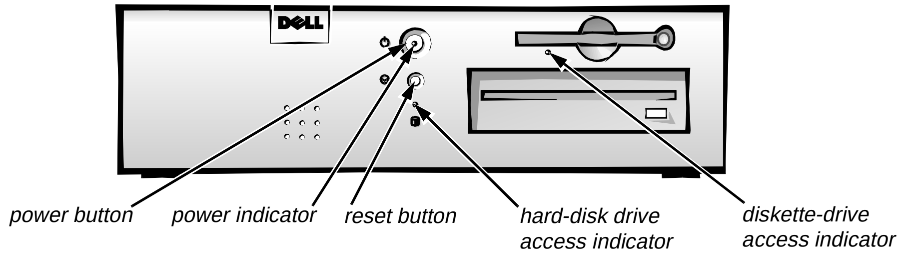


Midsize Computer

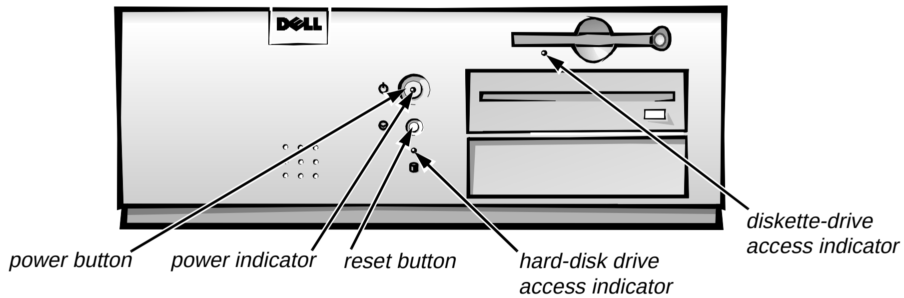


Mini Tower Computer

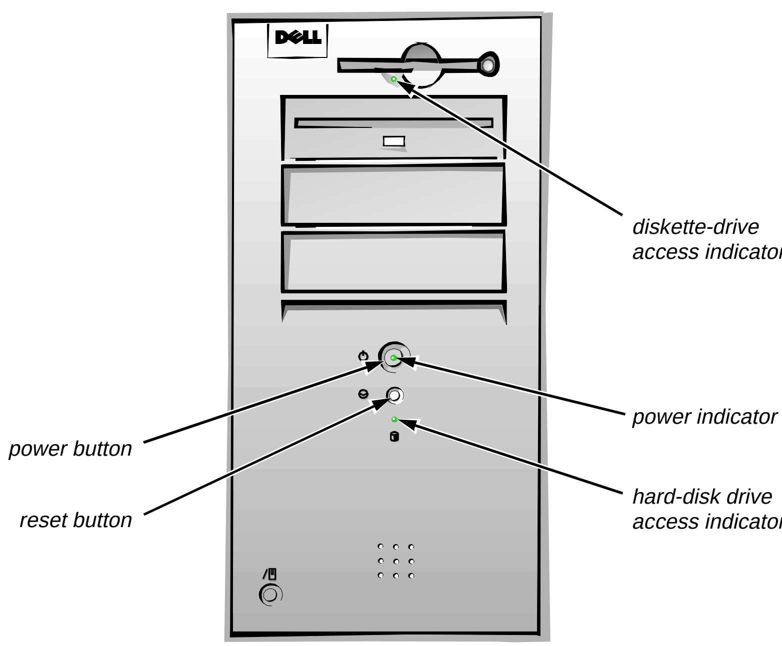
Figure 1-1. Computer Orientation



Low-Profile Computer



Midsize Computer



Mini Tower Computer

Figure 1-2. Front-Panel Features

CAUTION: To avoid possible data or file structure corruptions, the front-panel reset button should be used only when the computer cannot be rebooted by pressing <Ctrl><Alt><Del>. Before you use the reset button to initiate a hardware reset, close any open application programs and files if possible.

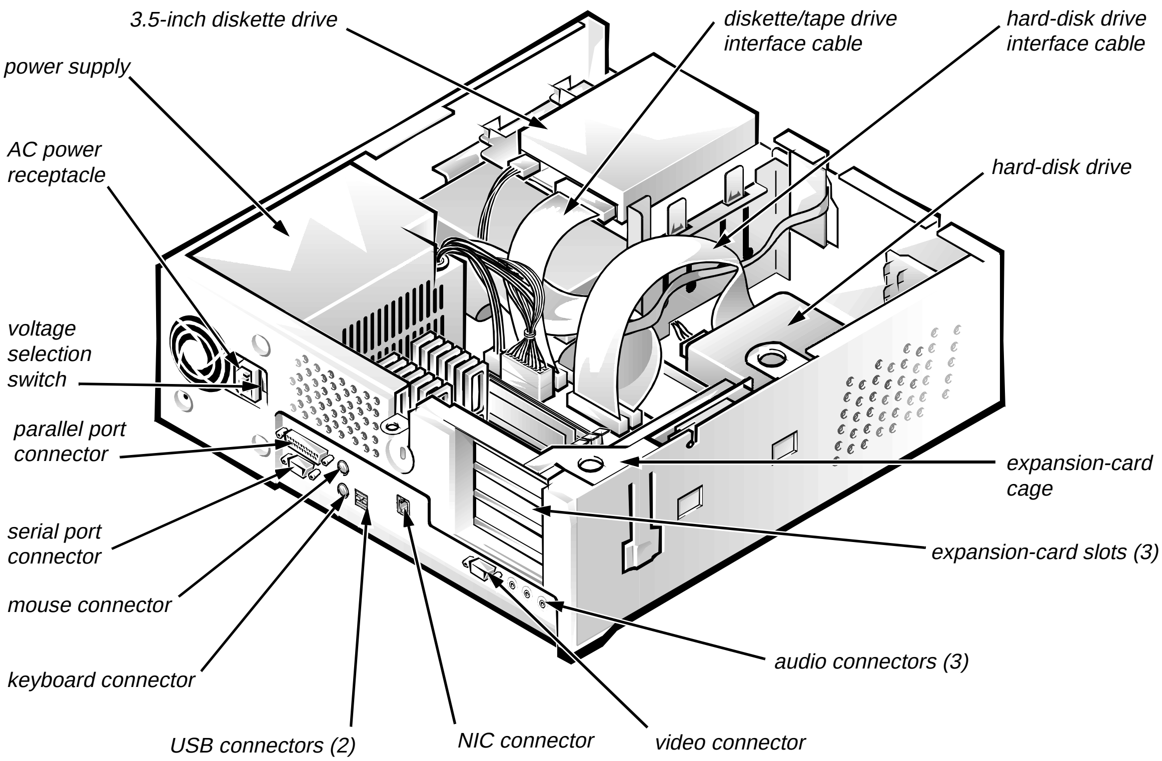


Figure 1-3. Internal View of the Low-Profile Computer

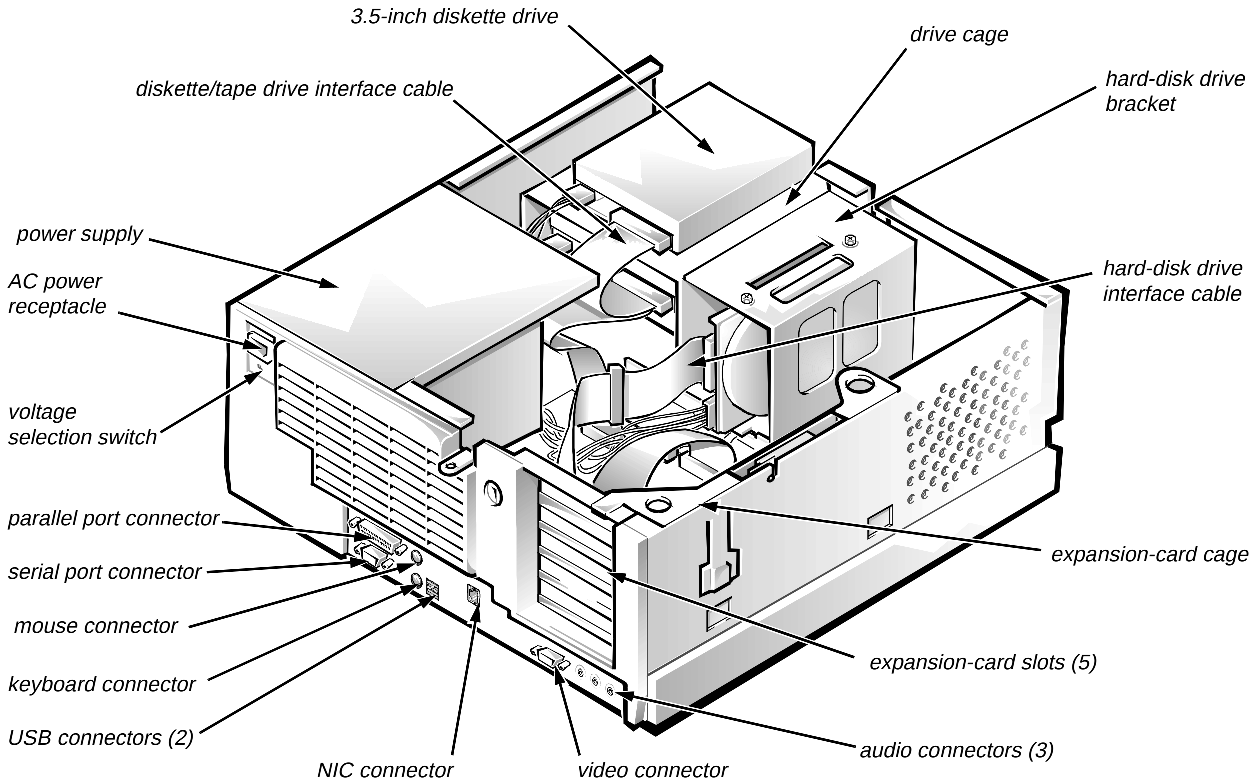


Figure 1-4. Internal View of the Midsize Computer

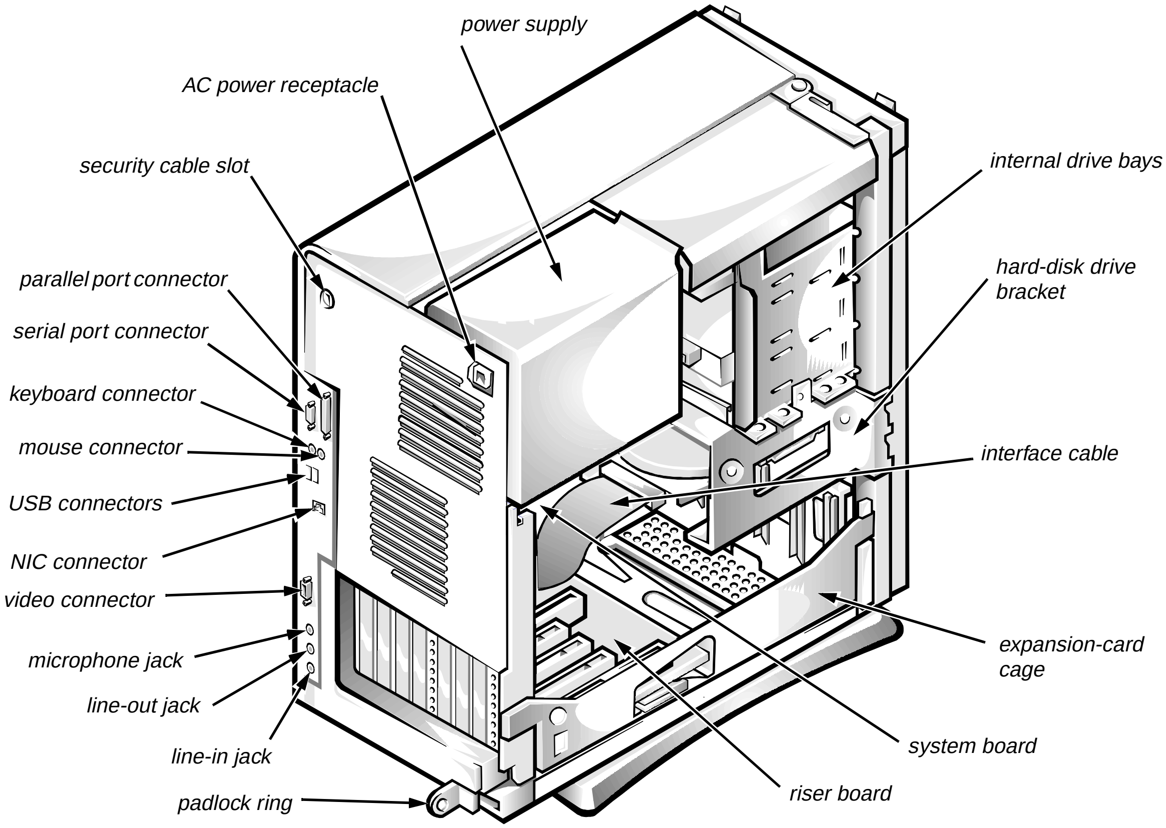


Figure 1-5. Internal View of the Mini Tower Computer

Advanced Expansion Subsystem

The Dell OptiPlex GXi systems offer advanced expansion subsystems that can support a mixture of traditional ISA expansion cards (called *legacy* cards), Plug and Play ISA expansion cards, and PCI expansion cards. The ISA Configuration Utility (ICU) included with the computer provides a means of avoiding resource conflicts that might arise from such an arrangement.

After all legacy cards have been configured with the ICU, the computer automatically assigns any required memory space, IRQ lines, and DMA channels to any installed Plug and Play ISA expansion cards and PCI expansion cards the next time the computer is rebooted. Chapter 3, “Using the ISA Configuration Utility,” in the *Reference and Installation Guide* describes the ICU and provides instructions for using it to configure the computer.

Low-Profile Computer’s Expansion-Card Slots

The low-profile computers have three expansion-card slots. The riser board has two ISA expansion-card connectors and two PCI expansion-card connectors. One PCI expansion-card connector and one ISA expansion-card connector share a single expansion-card slot, resulting in a total of three expansion-card slots (see Figure 1-6). The low-profile computers have a passive riser board, with no PCI-to-PCI bridge.

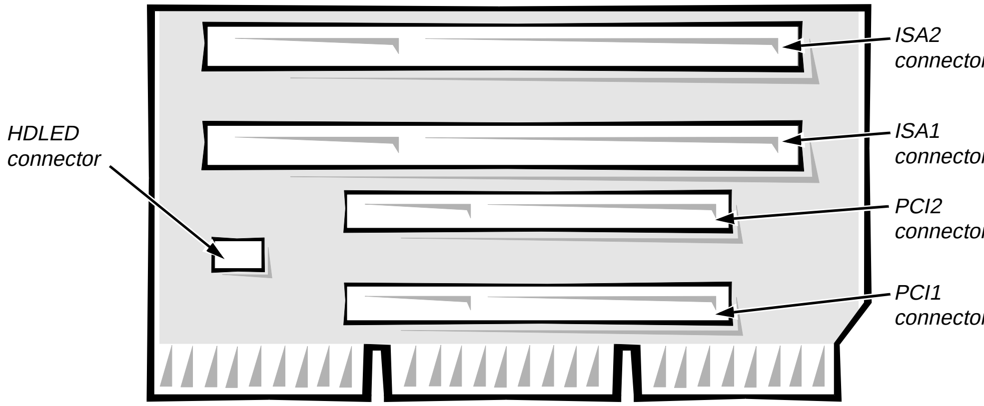


Figure 1-6. Riser Board for the Low-Profile Computers

Midsize Computer's Expansion-Card Slots

The midsize computers have five expansion-card slots. The riser board is offered in two options. Option 1 is a passive riser board, with no PCI-to-PCI bridge. Option 1 has three ISA expansion-card connectors and three PCI expansion-card connectors. One PCI expansion-card connector and one ISA expansion-card connector share a single expansion-card slot, resulting in a total of five expansion-card slots (see Figure 1-7). Option 2 is an active riser board, with a PCI-to-PCI bridge. Option 2 has two ISA expansion-card connectors and five PCI expansion-card connectors. Two PCI/ISA expansion-card connector pairs each share an expansion-card slot, again resulting in a total of five expansion-card slots (see Figure 1-8).

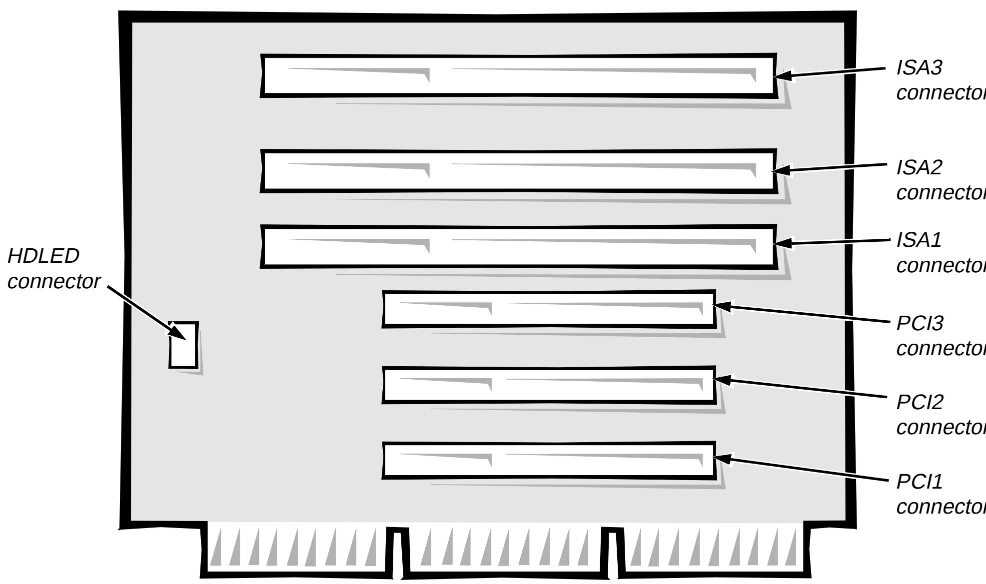


Figure 1-7. Riser Board for the Midsize Computers (Option 1)

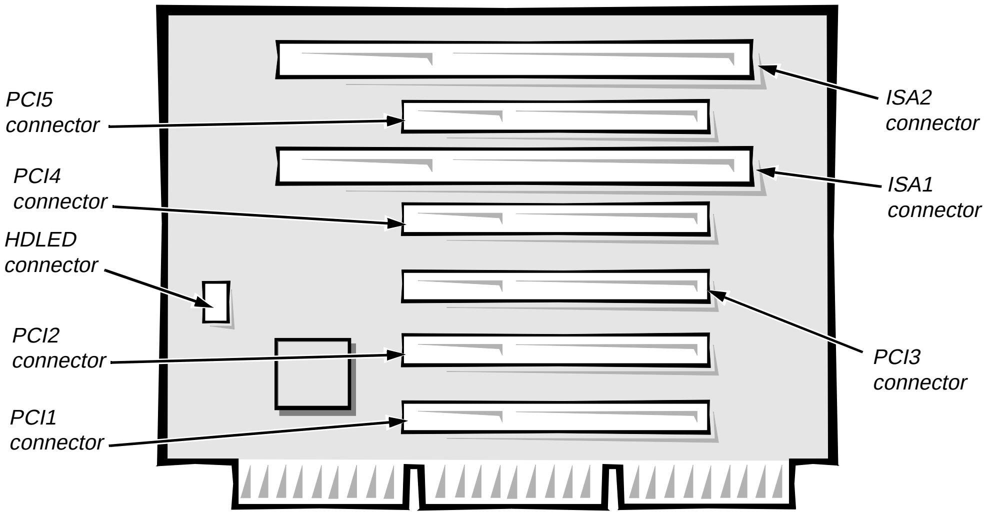


Figure 1-8. Riser Board for the Midsize Computers (Option 2)

Mini Tower Computer's Expansion-Card Slots

The mini tower computers have seven expansion-card slots. The riser board has four ISA expansion-card connectors and five PCI expansion-card connectors. Two PCI expansion-card connectors share expansion-card slots with ISA connectors, resulting in a total of seven expansion-card slots (see Figure 1-9). The riser board is active, incorporating PCI-to-PCI bridging.

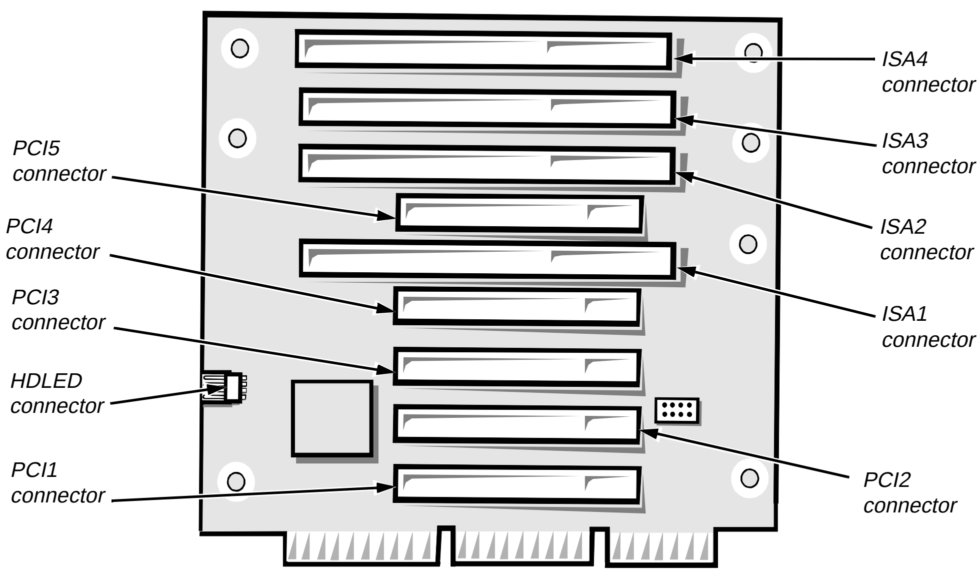


Figure 1-9. Riser Board for the Mini Tower Computers

Hard-Disk Drive Options

The following subsections provide service-related information about hard-disk drive options in the low-profile, midsize and mini tower computers.

Low-Profile Computers

The hard-disk drive assembly (consisting of the hard-disk drive and the hard-disk drive bracket) is located inside the chassis at the left front of the computer and is attached to the bottom of the chassis. One EIDE or SCSI 1-inch-high hard-disk drive can be mounted on the hard-disk drive bracket.

Midsize Computers

The hard-disk drive bracket is located next to the externally accessible drive bays at the front of the computer. The hard-disk drive bracket can contain either one or two 1-inch-high EIDE or SCSI hard-disk drives, or one 1-inch-high EIDE or SCSI hard-disk drive and one 1.6-inch-high EIDE or SCSI hard-disk drive.

Mini Tower Computers

The hard-disk drive bracket is located beneath the externally accessible drive bays at the front of the computer. The hard-disk drive bracket can contain either one or two 1-inch-high EIDE or SCSI hard-disk drives, or one 1-inch-high EIDE or SCSI hard-disk drive and one 1.6-inch-high EIDE or SCSI hard-disk drive.

Enhanced Dual-Interface EIDE Subsystem

The EIDE subsystem provides two mode-4, DMA bus-mastered EIDE interfaces, each of which can support up to two EIDE devices. The EIDE controller attaches to the high-speed PCI local bus.

The primary EIDE interface (IDE1) provides support for up to two high-performance EIDE devices. The computer's boot drive should be connected to the primary EIDE interface.

The secondary EIDE interface (IDE2) also provides support for up to two high-performance EIDE devices, typically EIDE tape drives or CD-ROM drives.

NOTE: The externally accessible drive bays at the front of the computer are normally used for diskette drives, CD-ROM drives, and/or tape drives. Hard-disk drives should be installed in the internal hard-disk drive positions described in "Hard-Disk Drive Options" found earlier in this chapter. For detailed information about the data storage subsystem, see Chapter 7, "Installing Drives," in the Reference and Installation Guide.

Built-In Video Controller

The video subsystem consists of a high-speed, high-resolution video controller built into the system board. Because the video controller connects to the PCI bus rather than to the ISA bus, communication between the video subsystem and the

microprocessor is much faster. The PCI bus operates at a frequency of 33 MHz as opposed to the 8.25-MHz operating frequency of the ISA bus.

The built-in video controller includes 2 MB of video memory built into the system board.

Built-In Audio Controller

The built-in audio controller is a single-chip sound solution. The audio controller connects to the ISA bus.

The audio controller has analog jacks for line-in and microphone input. The single line-out output jack provides stereo output for a line-level input to an external amplifier or drives stereo headphones. See "Technical Specifications" found later in this chapter for audio jack input and output specifications.

Built-In NIC

The Dell OptiPlex GXi systems have an integrated 10/100-Mbps 3Com® PCI 3C905 Ethernet NIC subsystem. The system contains either a 100BASE-TX or 100BASE-T4 NIC daughter board, depending on network cabling requirements. Both NIC daughter boards support the 10BASE-T Ethernet standard. To distinguish the two boards, the designation *T4* appears in the upper-right corner of the 100BASE-T4 board, as shown in Figure 1-10. For 10BASE-T and 100BASE-T4 networks, Category 3 or greater wiring and connectors can be used. For 100BASE-TX networks, Category 5 wiring and connections must be used.

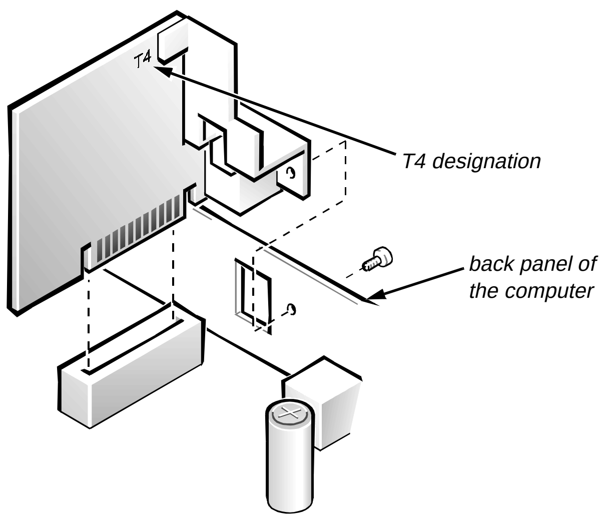


Figure 1-10. NIC Daughter Board

The NIC subsystem connects to the Ethernet network through a single RJ45 connector on the back panel of the computer. The RJ45 connector and NIC interface circuitry is mounted on the daughter board, which plugs into the system board.

Chapter 4, "Using Integrated Devices," in the *Reference and Installation Guide* provides instructions for connecting the mini tower computer to, and configuring it for, use on an Ethernet network. A *Dell OptiPlex GXi Systems Documentation Update* provides instructions for low-profile and midsize computers.

Floor Stand

The low-profile and midsize computers can be used in a vertical orientation using an available floor stand. The floor stand is attached to the left side of the low-profile or midsize computer. The floor stand is permanently attached to the bottom of the mini tower computer.

Computer Service

The following subsections provide service-related information about the computer.

System Power Supply

The low-profile computers have a 145-W system power supply, whereas the midsize and mini tower computers have a 200-W system power supply. Both system power supplies can operate from an AC power source of 115 VAC at 60 Hz or 230 VAC at 50 Hz. The system power supply provides the DC operating voltages and currents listed in Table 1-1.

NOTE: The power supply produces DC voltages only under its loaded condition. Therefore, when you measure these voltages, the DC power connectors must be connected to their corresponding power input connectors on the system board or drives.

Table 1-1. DC Voltage Ranges

Voltage	Range	Maximum Output Current[1]
+3.3 VDC	+3.15 to +3.45 VDC	12.0 A[1] (low-profile computers) 14.0 A[1] (midsize and mini tower computers)
+5 VDC	+4.75 to +5.25 VDC	18.0 A[1] (low-profile computers) 22.0 A[1] (midsize and mini tower computers)
+12 VDC	+11.40 to +12.60 VDC	3.0 A[2] (low-profile computers) 6.0 A[2] (midsize and mini tower computers)
–12 VDC	–10.80 to –13.20 VDC	0.3 A (low-profile computers) 0.3 A (midsize and mini tower computers)
–5 VDC	–4.50 to –5.50 VDC	0.3 A (low-profile computers) 0.3 A (midsize and mini tower computers)
+5 VFP[3]	+4.75 to +5.25 VDC	10 mA

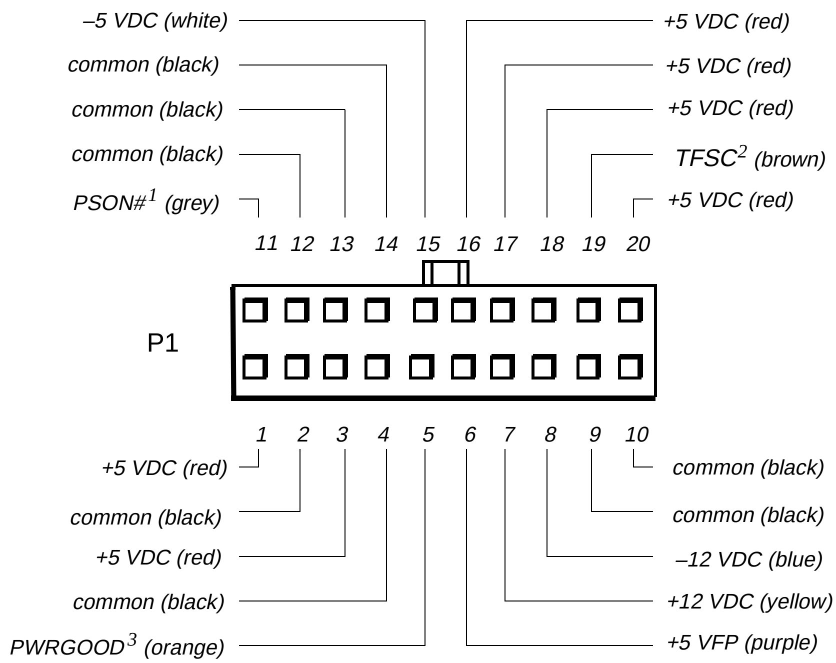
[1] *The combined load on the +5-VDC and +3.3-VDC outputs shall not exceed 105 W on the low-profile computers or 140 W on the midsize computers.*

[2] *Withstands surges of up to 11.0 A to support disk start-up operations.*

[3] *VFP (volts flea power) — sometimes called "standby power."*

Pin Assignments for the DC Power Connectors

The power-supply output voltages can be measured at the back (wire side) of the connectors without disconnecting them. Figures 1-11 through 1-13 show the wire side of the connectors.



[1] *Pin 11 — PSON# should measure between +4 and +5 VDC except when the power button on the front panel is pressed, taking PSON# to its active-low state.*

[2] *Pin 19 — Thermal fan-speed control (TFSC) is a power-supply input signal used to control the power-supply fan speed.*

[3] *Pin 5 — PWRGOOD should measure between +4 and +5 VDC when the power supply is on and operating to indicate that all power-supply output voltages are within ranges specified in Table 1-1.*

Figure 1-11. DC Power Connector P1

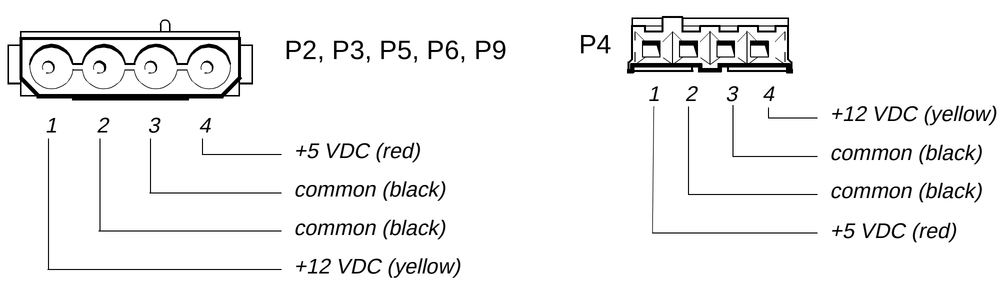


Figure 1-12. DC Power Connectors P2 (Midsize and Mini Tower), P3, P4, P5, P6, and P9

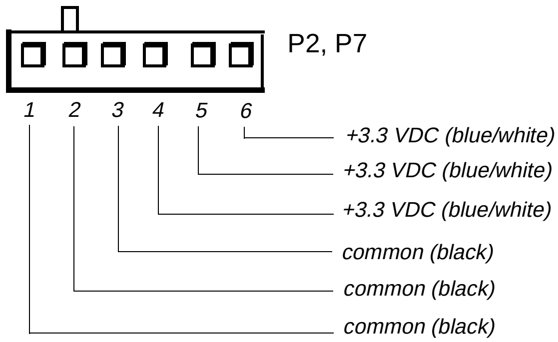


Figure 1-13. DC Power Connectors P2 (Low-Profile) and P7

DC Power Distribution

Figures 1-14 through 1-19 provide the following information about DC power distribution:

- Power-supply connector identification
- Power cable connections for diskette, tape, CD-ROM, and hard-disk drives
- Power distribution to sockets and connectors on the system board

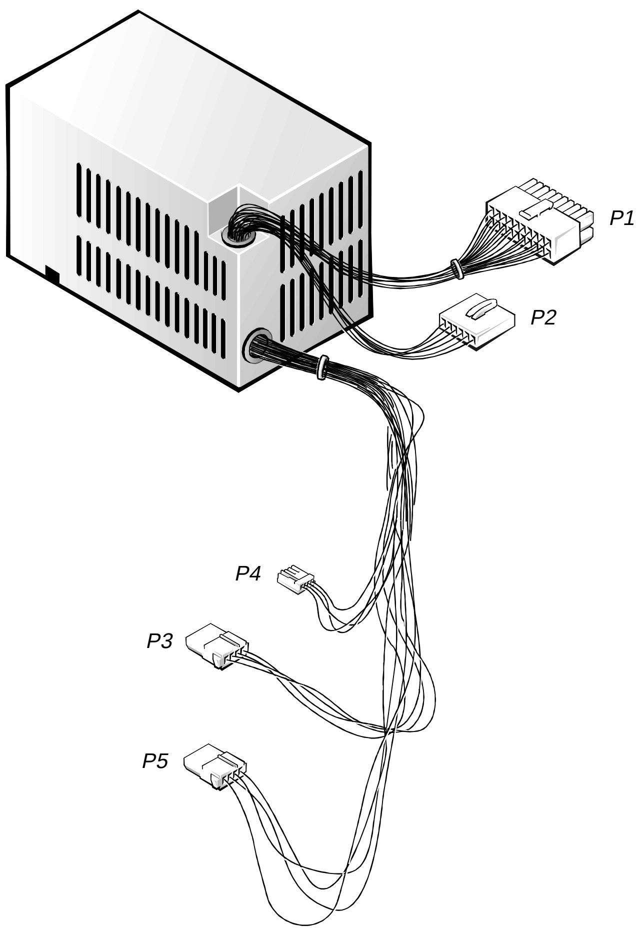


Figure 1-14. DC Power Cables for the Low-Profile Computers

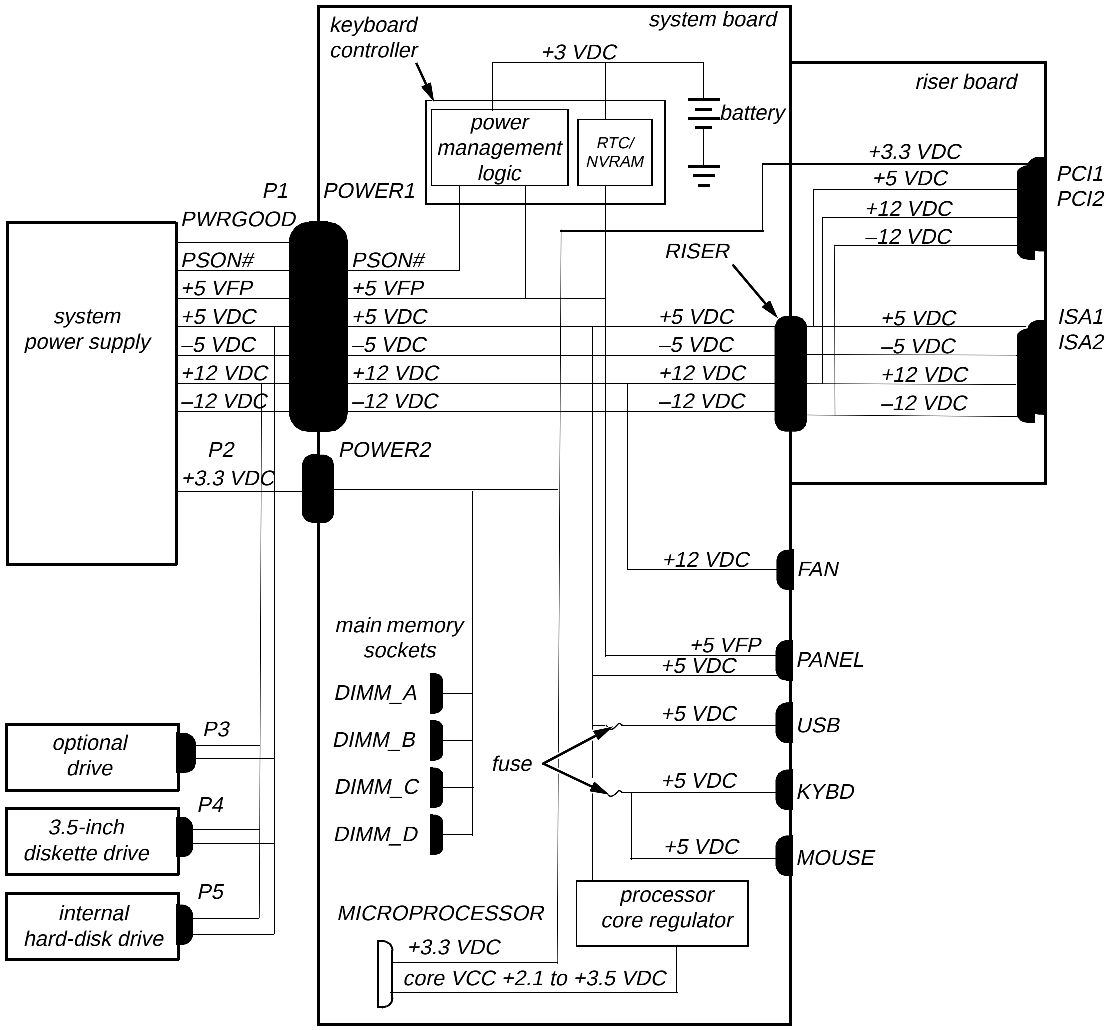
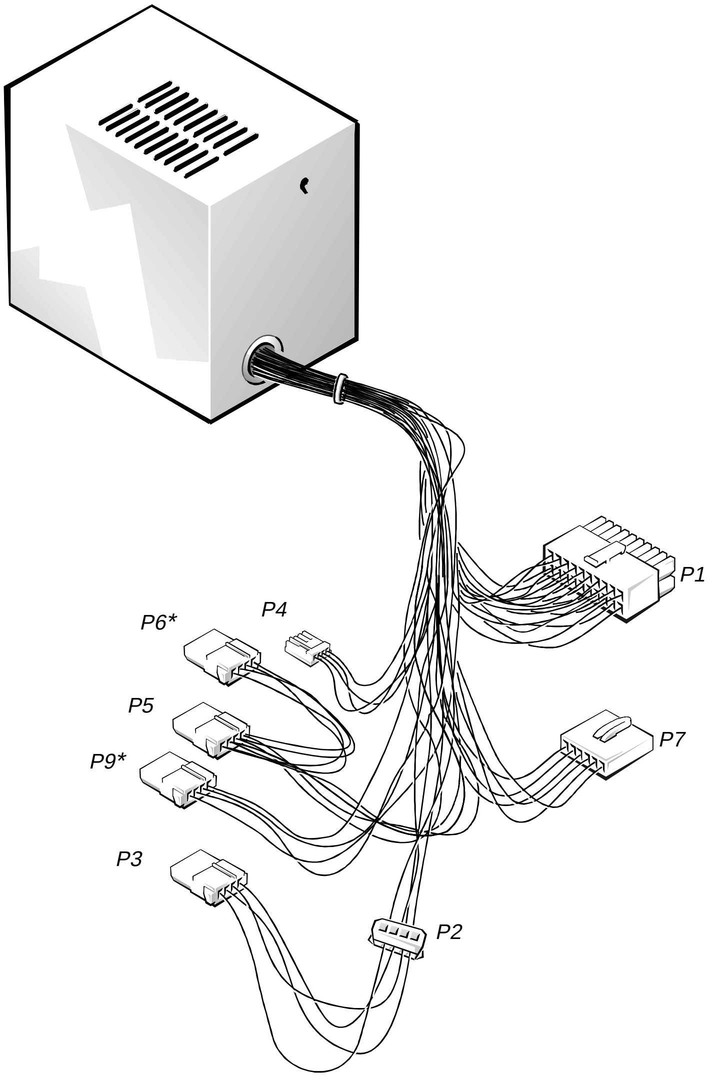
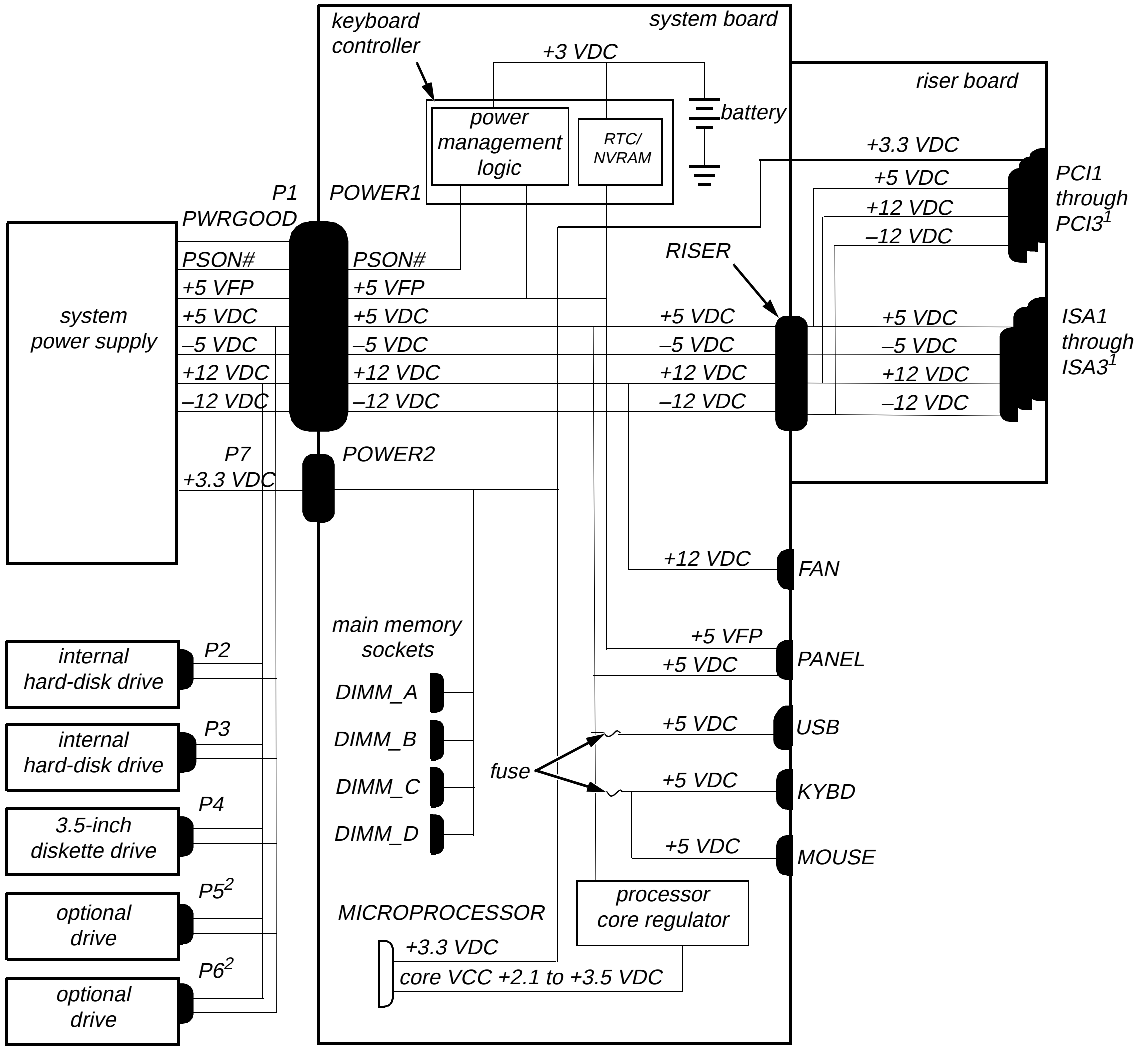


Figure 1-15. DC Power Distribution for the Low-Profile Computers



* *Connector P6 was not present in earlier midsize computers; in these computers, connector P9 was labeled "P6."*

Figure 1-16. DC Power Cables for the Midsize and Mini Tower Computers



1 *A second riser board option provides two additional PCI connectors (PCI4 and PCI5) and only two ISA connectors (ISA1 and ISA2).*

2 *Some computers have an additional connector (P9) that may be used instead of P5 or P6.*

Figure 1-17. DC Power Distribution for the Midsize Computers

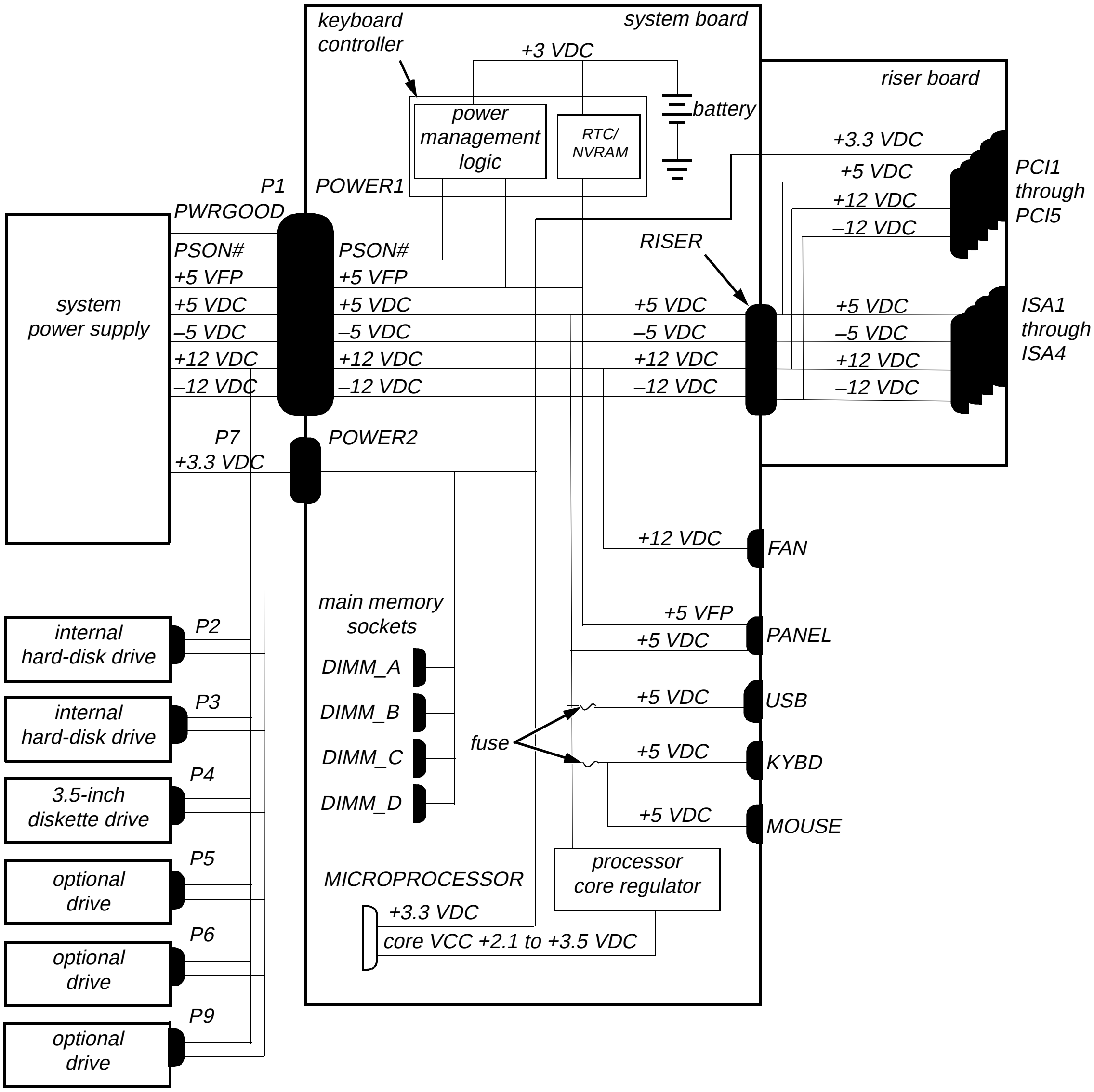


Figure 1-18. DC Power Distribution for the Mini Tower Computers

System Board

The subsections that follow provide service-related information about the system board and components. The same system board is used in the low-profile, midsize, and mini tower computers.

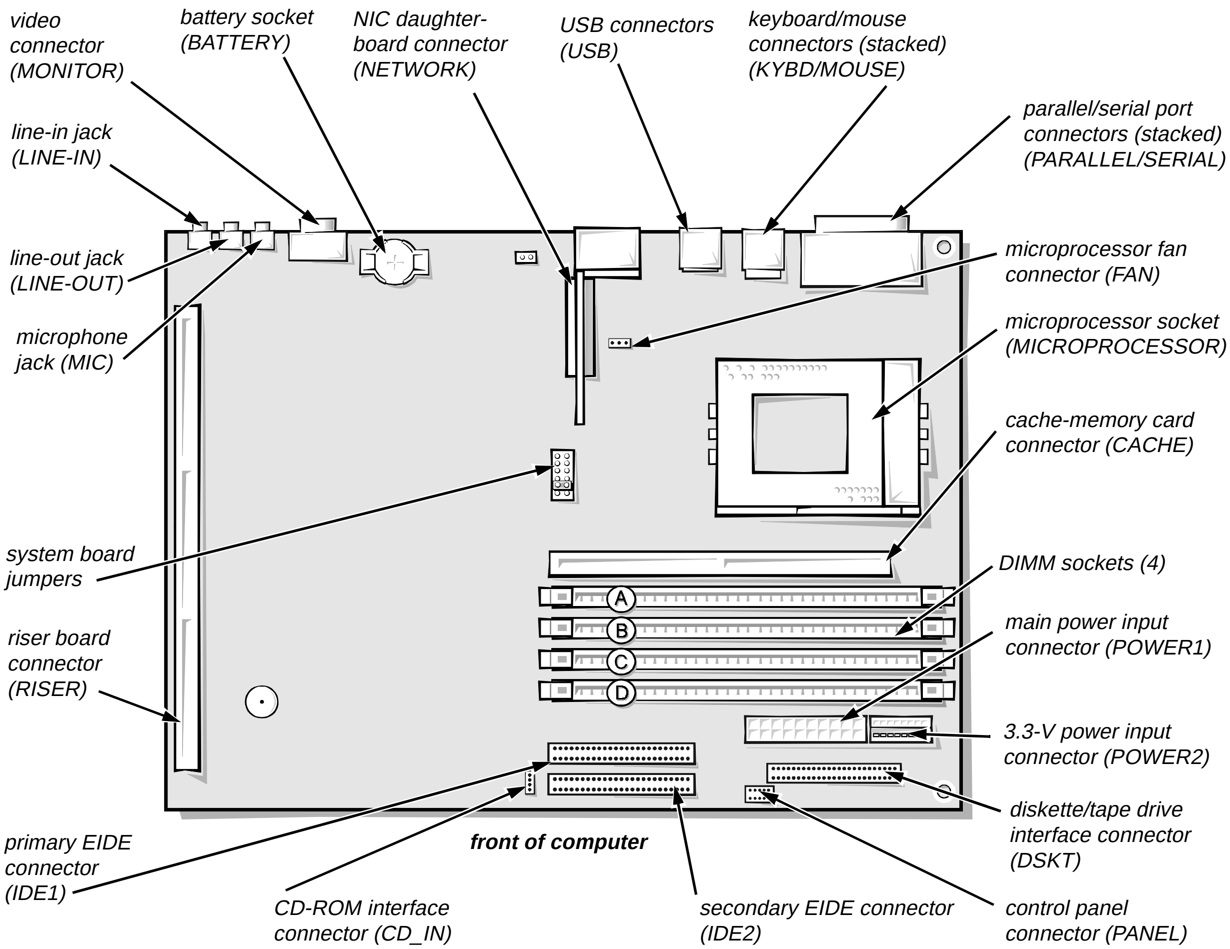


Figure 1-19. System Board Components

Main Memory

The four DIMM sockets on the system board can accommodate combinations of 8-, 16-, 32-, 64-, and 128-MB DIMMs up to a total memory capacity of 512 MB. Main memory can have either 72-bit parity (ECC) DIMMs or 64-bit nonparity DIMMs. The standard main memory is 16 MB of high-speed (60-ns) EDO-type memory with parity (ECC). The DIMMs can have different capacities, but must adhere to the following installation rules:

- The memory can support any mixture of 8-, 16-, 32-, 64-, and 128-MB DIMMs.
- The largest capacity DIMM must be in socket DIMM_A with decreasing capacities toward socket DIMM_D.
- ECC function is enabled when all installed DIMMs are 72-bit parity DIMMs and the ECC category is set to On in the System Setup program.

See the online *System User's Guide* or Chapter 6, "Installing System Board Options," in the *Reference and Installation Guide* for additional memory upgrade information.

System Board Jumpers

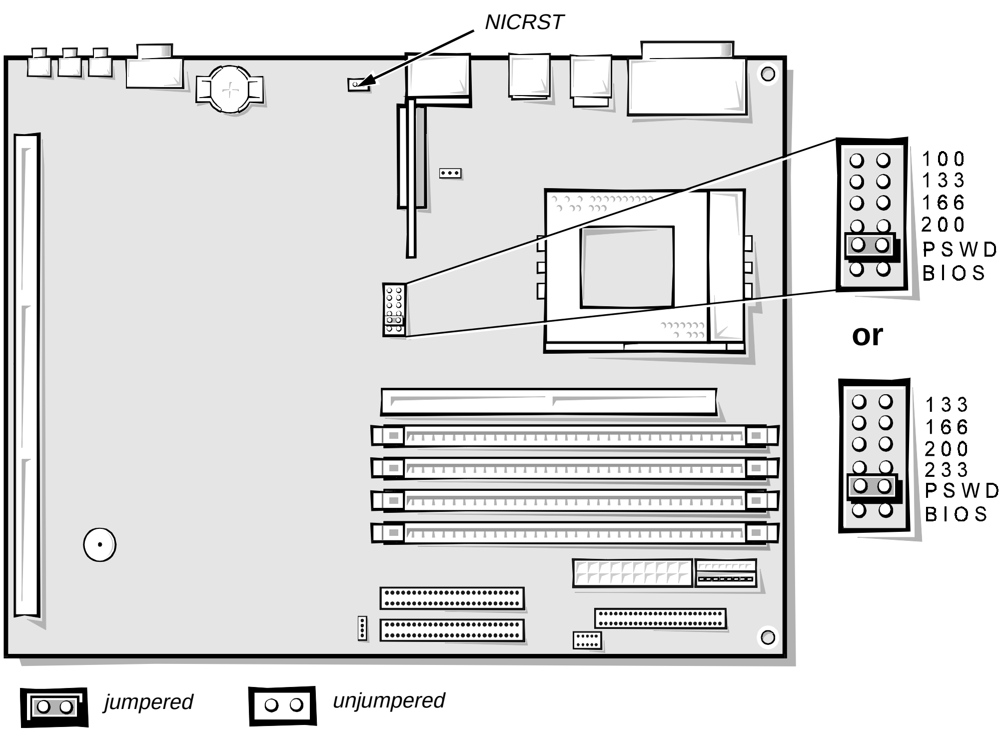


Figure 1-20. System Board Jumpers

Table 1-2. System-Board Jumper Descriptions

Jumper	Description	Settings
100*	Reserved	Do not install jumper.
133	Microprocessor speed	Install jumper if the microprocessor's internal speed is 133 MHz; otherwise the jumper should not be installed.
166	Microprocessor speed	Install jumper if the microprocessor's internal speed is 166 MHz; otherwise the jumper should not be installed.
200	Microprocessor speed	Install jumper if the microprocessor's internal speed is 200 MHz; otherwise the jumper should not be installed.
233	Microprocessor speed	Install jumper if the microprocessor's internal speed is 233 MHz; otherwise the jumper should not be installed.
PSWD	Password enable or disable	Install to enable the password feature.
BIOS	Reserved	Do not install jumper.
NICRST	NIC enable or disable	*Service procedure only* — Install jumper, then boot the computer to clear the NIC settings and reset the base address to 200h; then remove the jumper to allow configuration changes.

* *Not on all systems*

Interrupt Assignments

Table 1-3. Interrupt Assignments

IRQ Line	Used By/Available
IRQ0	Generated by system timer.
IRQ1	Generated by keyboard controller to indicate that keyboard's output buffer is full.
IRQ2	Generated internally by interrupt controller to enable IRQ8 through IRQ15.
IRQ3	Available for use by an expansion card.
IRQ4	Generated by super I/O controller to indicate that the device connected to the serial port (COM1 or COM3) requires service.
IRQ5	Available for use by an expansion card.
IRQ6	Generated by super I/O controller to indicate that diskette or tape drive requires service.
IRQ7	Generated by super I/O controller to indicate that device connected to parallel port requires service.
IRQ8	Generated by keyboard controller for each tick of RTC.
IRQ9	Available for use by an expansion card.
IRQ10	Available for use by an expansion card.
IRQ11	Available for use by an expansion card.
IRQ12	Generated by keyboard controller to indicate that mouse's output buffer is full.
IRQ13	Generated by math coprocessor to indicate coprocessor error.
IRQ14	Generated by device connected to primary EIDE port to indicate that device requires service. If the EIDE controller is disabled, this line is available for other use.
IRQ15	Generated by device connected to secondary EIDE port to indicate that device requires service. If the EIDE controller is disabled, this line is available for other use.

NOTE: The built-in sound controller, built-in NIC, and built-in video controllers are assigned available IRQs automatically during system start-up.

DMA Channel Assignments

Table 1-4. DREQ Line Assignments

DREQ Line	Used By/Available
DREQ0	Available
DREQ1	Available
DREQ2	Generated by super I/O controller to initiate DMA cycle for attached diskette drive
DREQ3	Available
DREQ4	Generated by bus controller chip to activate second DMA controller
DREQ5	Available
DREQ6	Available
DREQ7	Available

NOTE: The built-in sound controller, built-in NIC, and built-in video controllers are assigned available DMA channels automatically during system start-up.

Technical Specifications

Table 1-5. Technical Specifications

Microprocessor	
Microprocessor type	Intel Pentium microprocessor or Intel Pentium microprocessor with MMX technology
Microprocessor speed	133, 166, or 200 MHz for standard microprocessors 166, 200, or 233 MHz for microprocessors with MMX technology
Internal system clock	66 MHz
Internal cache	16 KB (8-KB data cache; 8-KB instruction cache) on standard microprocessors 32 KB (16-KB data cache; 16-KB instruction cache) on microprocessors with MMX technology
Math coprocessor	internal to the microprocessor
System Information	
System chip set	Intel 430HX PCI chip set
Data bus width	64 bits
Address bus width.	32 bits
DMA channels	seven
Interrupt levels	15
Flash EPROM (BIOS)	1 Mb
Expansion Bus	
Bus types.	PCI and ISA (PCI bus complies with PCI specification 2.1)
Bus speeds.	PCI: 33 MHz; ISA: 8.25 MHz
PCI expansion-card connectors:	
Low-profile computers . . .	two (one PCI connector and one ISA connector share an expansion-card slot)
Midsize computers	three (one PCI connector and one ISA connector share an expansion-card slot) *or* four (two share expansion-card slots)
Mini tower computers. . .	five (two PCI connectors share expansion-card slots with ISA connectors)

Table 1-5. Technical Specifications *(continued)*

Expansion Bus *(continued)*	
ISA expansion-card connectors:	
Low-profile computers . . .	two (one ISA connector and one PCI connector share an expansion-card slot)
Midsize computers	three (one ISA connector and one PCI connector share an expansion-card slot) *or* two (both share expansion-card slots)
Mini tower computers	four (two ISA connectors share expansion-card slots with PCI connectors)
NIC	
NIC	integrated 3Com PCI 3C905 network controller, operating at 10 or 100 Mb/sec
Memory	
Architecture	64-bit (non-ECC) or 72-bit (ECC), noninterleaved
DIMM sockets	four (gold contacts)
DIMM capacities	8- and 16-MB nonparity EDO; 8-,16-, 32-, 64-, and 128-MB parity EDO (ECC)
Standard RAM	16 MB
Maximum RAM	512 MB
External cache memory	256- or 512-MB pipeline-burst direct-mapped write-back SRAM
BIOS address	0F0000h
Drives	
Externally accessible bays:	
Low-profile computers . . .	one 3.5-inch bay, dedicated to a 3.5-inch diskette drive; one 5.25-inch bay for a diskette drive, tape drive, or CD-ROM drive
Midsize computers	one 3.5-inch bay, dedicated to a 3.5-inch diskette drive; two 5.25-inch bays for diskette drives, tape drives, or CD-ROM drives
Mini tower computers	one 3.5-inch bay, dedicated to a 3.5-inch diskette drive; three 5.25-inch bays for diskette drives, tape drives, or CD-ROM drives

Table 1-5. Technical Specifications *(continued)*

Drives *(continued)*	
Internal hard-disk drive bays:	
Low-profile computers . . .	one bay for a 1-inch-high EIDE or SCSI hard-disk drive
Midsize computers	two bays for either one or two 1-inch-high EIDE or SCSI hard-disk drives, or one 1-inch-high EIDE or SCSI hard-disk drive and one 1.6-inch-high EIDE or SCSI hard-disk drive
Mini tower computers . . .	two bays for either one or two 1-inch-high EIDE or SCSI hard-disk drives, or one 1-inch-high EIDE or SCSI hard-disk drive and one 1.6-inch-high EIDE or SCSI hard-disk drive
Video	
Video type	S3 Trio 64V+ 86C765 built-in SVGA controller attached to the PCI bus
Video memory.	2 MB
Maximum video resolution . . .	1280 x 1024 pixels, with 256 colors
Ports	
Externally accessible:	
Serial (DTE)	one 9-pin connector (16550-compatible)
Parallel	one 25-hole connector (bidirectional)
Video.	one 15-hole connector
PS/2-style keyboard	6-pin mini-DIN
PS/2-compatible mouse	6-pin mini-DIN
NIC	RJ45 connector
USB.	two USB-compliant connectors
Audio line-in.	2.0 V rms maximum, stereo signal
Audio microphone	89 mV rms maximum, mono signal
Audio line-out	1.4 V rms maximum, stereo signal at 32-ohms minimum impedance

Table 1-5. ***Technical Specifications*** *(continued)*

Ports *(continued)*	
Internally accessible:	
EIDE hard-disk drive . . .	two 40-pin connectors on PCI local bus
Diskette drive	34-pin connector
CD-ROM drive.	4-pin connector
Key Combinations	
<Ctrl><Alt><Del>.	restarts (reboots) the system
<Ctrl><Alt><Enter>	starts System Setup program (during POST only)
<Ctrl><Alt><\>	toggles microprocessor speeds on 101-key keyboard (in MS-DOS® real mode only)
<Ctrl><Alt><#>.	toggles microprocessor speeds on 102-key keyboard (in MS-DOS real mode only)
Controls and Indicators	
Reset control.	push button
Power control	push button
Power indicator.	green LED
Diskette-drive access indicator	green LED
Hard-disk drive access indicator	green LED
Link integrity indicator (on NIC connector).	green LED
Activity indicator (on NIC connector).	yellow LED
Power	
Power supply wattage:	
Low-profile computers . . .	145 W
Midsize computers	200 W
Mini tower computers. . . .	200 W

Table 1-5. Technical Specifications *(continued)*

Power *(continued)*	
Power-supply heat dissipation:	
Low-profile computers . . .	808 BTUs (nominal)
Midsize computers	913 BTUs (nominal)
Mini tower computers. . .	913 BTUs (nominal)
Power supply voltage	90 to 135 V at 60 Hz; 180 to 265 V at 50 Hz
Backup battery	3-V CR2032 coin cell
Physical	
Low-profile computers:	
Height	10.9 cm (4.3 inches)
Width.	40.89 cm (16.1 inches)
Depth.	43.69 cm (17.2 inches)
Weight (minimum)	10.89 kg (24 lb)
Midsize computers:	
Height	16.5 cm (6.5 inches)
Width.	41.9 cm (16.5 inches)
Depth.	44.5 cm (17.5 inches)
Weight (minimum)	12.7 kg (28 lb)
Mini tower computers:	
Height	44.4 cm (17.5 inches)
Width.	20.6 cm (8.1 inches)
Depth.	43.7 cm (17.2 inches)
Weight (minimum)	14.9 kg (33 lb)
Environmental	
Temperature:	
Operating	10° to 35°C* (50° to 95°F)
Storage	–40° to 65°C (–40° to 149°F)
Relative humidity	8% to 80% (noncondensing)

* *The maximum operating temperature of 35°C (95°F) is for altitudes below 914.6 m (3000 ft). Above 914.6 m (3000 ft) the maximum operating temperature is reduced.*

Table 1-5. Technical Specifications *(continued)*

Environmental *(continued)*	
Maximum vibration:	
Operating	0.25 G at 3 to 200 Hz at 1 octave/min
Storage	0.5 G at 3 to 200 Hz at 1 octave/min
Maximum shock:	
Operating	left side (low-profile and midsize for operation in a vertical orientation) and bottom half-sine pulse with a change in velocity of 20 inches/sec (50.8 cm/sec)
Storage	27-G faired square wave with a velocity change of 200 inches/sec (508 cm/sec)
Altitude:	
Operating	–16 to 3048 m * (–50 to 10,000 ft)
Storage	–16 to 10,600 m (–50 to 35,000 ft)

* *The maximum operating temperature of 35°C (95°F) is for altitudes below 914.6 m (3000 ft). Above 914.6 m (3000 ft) the maximum operating temperature is reduced.*

Chapter 2
Basic Troubleshooting

This chapter describes basic troubleshooting procedures that can help you diagnose a system problem. These procedures can often reveal the source of a problem or indicate the correct starting point for troubleshooting the system. A brief explanation of how to load and start the diskette-based diagnostics is located at the end of the chapter. Dell recommends that you perform the following procedures in the order they are presented in this manual.

Initial User Contact

When you first contact a user who has a problem, ask the user to describe the problem and the conditions under which it occurs. A verbal description can often indicate the cause of a problem or indicate the appropriate troubleshooting procedure to use. After the user describes the problem, follow these steps:

1. **Ask the user to back up any data on the hard-disk drive if the system's condition permits.**

   See "Maintaining the System," in the online *System User's Guide* for information about backing up data.

2. **Ask the user to try to duplicate the problem by repeating the operations he or she was performing at the time the problem occurred.**

   Can the user duplicate the problem?

   Yes. Proceed to step 3.

   No. Proceed to the next section, "External Visual Inspection."

3. **Observe the user to determine if he or she is making an error, such as typing an incorrect key combination or entering a command incorrectly.**

   Is the problem a result of user error?

   Yes. Instruct the user in the proper procedure, or direct him or her to the appropriate user documentation for the correct procedure.

   No. Proceed to the next section, "External Visual Inspection."

External Visual Inspection

The external visual inspection consists of a quick inspection of the exterior of the computer, the monitor, the keyboard, any peripherals, and cables. While performing the visual inspection, make any necessary corrections. To perform the external visual inspection, follow these steps:

1. **Turn off the computer, the monitor, and all peripherals.**
2. **Verify that all power cables are properly connected to the computer, the monitor and peripherals, and their power sources.**
3. **Verify that the keyboard and mouse interface cables are firmly attached to the proper connectors on the back of the computer.**

   For a PS/2-compatible mouse, the keyboard and mouse interface cable connectors are identical except for their labels. If needed, see “System Features” in Chapter 1.

   For a serial mouse, the mouse interface cable must be firmly attached to one of the serial port connectors, and its captive screws must be secure enough to ensure a firm connection.
4. **Verify that any devices attached to the serial and parallel port connectors are properly connected.**

   Each of the serial and parallel interface cables must be firmly attached to an appropriate connector on the back of the computer as well as to the interface connector on the device. The captive screws that secure these connectors at each end of the interface cable must be secure enough to ensure a firm connection.
5. **Verify that the video interface cable is firmly attached to the video connector on the back of the computer and to the connector on the back of the monitor.**

   For proper connection of the video monitor, see the documentation for the monitor.
6. **Inspect all external monitor controls for any obvious damage or improper settings.**

   For proper settings of the video monitor controls, see the documentation for the monitor.
7. **Inspect the keyboard to ensure that no keys are sticking.**

   If one or more keys are sticking, it may be necessary to replace the keyboard.

8. **Inspect the exterior of the computer, including all controls and indicators, and all user-accessible data storage devices for any signs of physical damage.**

   Does the inspection reveal any problems?

   Yes. Refer to the procedure in Chapter 4, “Removing and Replacing Parts on the Low-Profile Chassis,” Chapter 5, “Removing and Replacing Parts on the Midsize Chassis,” or Chapter 6, “Removing and Replacing Parts on the Mini Tower Chassis,” as appropriate for your system.

   No. Proceed to the next section, “Observing the Boot Routine.”

Observing the Boot Routine

After you have performed an external visual inspection as described in the previous section, you should boot the system and, while the boot routine is running, observe the system for any indications of problems.

NOTE: Most of the steps in this procedure require observation of system functions and indications, some of which can occur simultaneously. It may be necessary to reboot the system several times in order to complete all of these steps.

To observe problem indications during the boot routine, follow these steps:

1. **Insert the diagnostics diskette into drive A. Turn on all peripherals and the computer. If the computer is already on, press the reset button or <Ctrl><Alt><Del> to reboot the system.**
2. **Check the power supply fan.**

   Does the fan run normally?

   Yes. Proceed to step 3.

   No. Troubleshoot the system power supply.
3. **Watch the Num Lock, Caps Lock, and Scroll Lock indicators on the upper-right corner of the keyboard. After all three indicators flash momentarily, the Num Lock indicator should light up and remain on.**

   Do these indicators flash on and off within approximately ten seconds after the boot routine starts?

   Yes. Proceed to step 4.

   No. Troubleshoot the system power supply. If the troubleshooting procedure indicates that the system power supply is operational, troubleshoot the memory subsystem.

4. **During the boot routine, observe the system for any of the following:**

   - *Diskette-drive and hard-disk drive access indicators*: These indicators light up in response to data being transferred to or from the drives. If either of these indicators fails to light up during the boot routine, troubleshoot the diskette drive or hard-disk drive subsystem, as appropriate.
   - *System error messages:* These messages can indicate problems or provide status information. If a system error message is displayed, see Table 3-2.
   - *Beep codes:* A beep code is a series of beeps that indicates an error condition. If the system emits a beep code, see Table 3-1.

     NOTE: The system beeps once during the boot routine. This single beep is normal and is not a beep code.

5. **Observe the monitor screen for the Diagnostics Menu.**

   Does the Diagnostics Menu appear?

   Yes. See "Running the Diskette-Based Diagnostics" found later in this chapter.

   No. Proceed to step 6.

6. **Insert another copy of the diagnostics diskette into the diskette drive, and reboot the system.**

   Does the Diagnostics Menu appear?

   Yes. See "Running the Diskette-Based Diagnostics" found later in this chapter.

   No. Proceed to the next section, "Internal Visual Inspection."

Internal Visual Inspection

CAUTION: Before you proceed with the internal visual inspection described in this section, ensure that the user has saved all open files and exited all open application programs if possible.

A simple visual inspection of a computer's interior hardware can often lead to the source of a problem, such as a loose expansion card, cable connector, or mounting screw. When you perform the visual inspection, refer to "System Features" in Chapter 1 to locate components in the inspection procedure.

To perform the internal visual inspection, follow these steps:

1. **Turn off the system, including any attached peripherals, and disconnect all the AC power cables from their power sources.**
2. **Remove the computer cover.**

3. **Verify that all chips, DIMMs, and expansion cards are fully seated in their sockets or connectors.**

   > **WARNING: The microprocessor can get extremely hot. Be sure the chip has had sufficient time to cool before you touch it.**
   >
   > **While reseating the microprocessor, use a wrist grounding strap or maintain contact with a metal surface on the chassis.**

   To ensure that the chips are fully seated in their sockets, press firmly on the top of each chip.

   To reseat the microprocessor, remove it from its socket and reinstall it as described in “Microprocessor/Heat Sink Assembly” in Chapter 4, 5, or 6, as appropriate for your system.

   To reseat a DIMM, remove it from its socket and reinstall it as described in “DIMMs” in Chapter 4, 5, or 6, as appropriate for your system.

   If you need to reseat an expansion card, remove it from its connector and reinstall it as described in “Expansion Cards” in Chapter 4, 5, or 6, as appropriate for your system. Grasp the card by its top corners, and carefully pull it out of its connector. Reinsert the card in its connector, and carefully push it in until it is fully seated. Then reinstall the card-mounting bracket’s retaining screw.

4. **Verify that all jumpers are set correctly.**

   For information about these jumpers, see “System Board Jumpers” in Chapter 1.

5. **Check all cable connectors inside the computer to verify that they are firmly attached to their appropriate connectors.**

6. **Reinstall the computer cover.**

7. **Reconnect the computer and any attached peripherals to their power sources, and turn them on.**

   Does the problem appear to be resolved?

   Yes. No further steps are necessary. Terminate the procedure.

   No. Proceed to the next sections, “Eliminating Resource Conflicts,” “Running the Diskette-Based Diagnostics,” and “Getting Help,” found later in this chapter.

Eliminating Resource Conflicts

Devices within the computer may require dedicated memory spaces, interrupt levels, or DMA channels, all of which must be allocated during installation of the devices. Because a device may be installed at a different time, it is possible that the same resource is assigned to two or more devices.

Resource conflicts can result in disorderly or erratic system operation or failure of the system to operate at all. If you suspect that resource conflicts might exist, check the system and reassign the resources as necessary.

Running the Diskette-Based Diagnostics

The diskette-based diagnostics (included with the system) contains tests that aid in troubleshooting all major components of the system.

CAUTION: To prevent damage to the original diagnostics diskette, always use a backup copy of the diagnostics diskette when servicing a user's computer. Dell recommends that users make several copies of this diskette to ensure that one is always available.

To start the diagnostics, turn off the system, insert a diagnostics diskette into drive A, and then turn on the system.

Starting the diagnostics causes the Dell logo screen to appear on the monitor screen, followed by a message indicating that the diagnostics is loading. Before the diagnostics loads, a program tests the portion of main memory (RAM) required for loading the diagnostics. If a main memory error is detected, a message appears on the screen telling you which DIMM has failed.

If no errors are found in main memory, the diagnostics loads and the Diagnostics Menu appears. This menu lets you choose the following options or exit to the MS-DOS prompt:

- Run Quick Tests — Runs selected tests from all test groups to quickly locate a failure or to indicate where further testing is needed to isolate a failure
- Run All Tests — Runs all tests for a thorough test of the system
- Run Specific Tests — Tests a particular area or subsystem

Getting Help

If none of the troubleshooting procedures in this chapter or the tests in the diskette-based diagnostics reveals the source of the problem or leads to the proper troubleshooting steps for determining the source of the problem, call Dell for technical assistance. For instructions, see "Getting Help" in the online *System User's Guide.*

Chapter 3
Beep Codes and Error Messages

This chapter describes beep codes and system error messages that can occur during the POST or, in the case of some failures, during normal system operation. The tables in this chapter list faults that can cause a beep code or system error message to occur and the probable causes of the fault in each case.

If a faulty system does not emit beep codes or display system error messages to indicate a failure, you should use the diskette-based diagnostics to run the appropriate tests to help isolate the source of the problem. See "Running the Diskette-Based Diagnostics" in Chapter 2.

POST Beep Codes

If the monitor cannot display error messages during the POST, the system may emit a series of beeps that identifies the problem or that can help you identify a faulty component or assembly. Table 3-1 lists the beep codes that may be generated during the POST. Most beep codes indicate a fatal error that prevents the system from completing the boot routine until the indicated condition is corrected.

When the system emits a beep code, record the code and then find it in Table 3-1. If the table does not lead to the source of the problem, run the appropriate tests in the diskette-based diagnostics to assist in troubleshooting the problem.

Table 3-1. POST Beep Codes

Beep Code	Error	Probable Causes
1-3	Monitor not detected	Disconnected or faulty monitor
1-1-3	NVRAM write/read failure	Defective system board
1-1-4	BIOS checksum failure	Faulty BIOS or defective system board
1-2-1	Programmable interval-timer failure	Defective system board
1-2-2	DMA initialization failure	
1-2-3	DMA page register write/ read failure	
1-3-1	Main-memory refresh verification failure	Faulty or improperly seated DIMM or defective system board
1-3-2	No memory installed	No memory installed or faulty or improperly seated DIMM
1-3-3	Chip or data line failure in the first 64 KB of main memory	Faulty or improperly seated DIMM
1-3-4	Odd/even logic failure in the first 64 KB of main memory	
1-4-1	Address line failure in the first 64 KB of main memory	
1-4-2	Parity failure in the first 64 KB of main memory	
2-1-1 through 2-4-4	Bit failure in the first 64 KB of main memory	
3-1-1	Slave DMA-register failure	Defective system board
3-1-2	Master DMA-register failure	
3-1-3	Master interrupt-mask register failure	
3-1-4	Slave interrupt-mask register failure	
3-2-4	Keyboard-controller test failure	Faulty keyboard controller (defective system board)

Table 3-1. POST Beep Codes *(continued)*

Beep Code	Error	Probable Causes
3-3-4	Screen initialization failure	Faulty video subsystem (defective system board)
3-4-1	Screen-retrace test failure	
3-4-2	Search for video ROM failure	
4-2-1	No timer tick	Defective system board
4-2-2	Shutdown failure	
4-2-3	Gate A20 failure	
4-2-4	Unexpected interrupt in protected mode	
4-3-1	Memory failure above address 0FFFFh	Faulty or improperly seated DIMM
4-3-3	Timer-chip counter 2 failure	Defective system board
4-3-4	Time-of-day clock stopped	Bad battery or defective system board
4-4-1	Serial-port test failure	Faulty I/O chip (defective system board)
4-4-2	Parallel-port test failure	
4-4-3	Math coprocessor failure	Faulty microprocessor chip or system board
4-4-4	Cache test failure	Defective microprocessor or system board

System Error Messages

Table 3-2 lists (in alphabetical order) system error messages that can appear on the monitor screen. These messages can help you find the source of a problem. Some of these error messages indicate fatal errors. When a fatal error occurs, the computer cannot usually be rebooted until an appropriate hardware change has been made. The following messages indicate a fatal error:

- `Bad error-correction code (ECC) on disk read`
- `Controller has failed`
- `Data error`
- `Gate A20 failure`
- `Hard disk controller failure`
- `Hard disk drive read failure`
- `Hard disk failure`
- `Keyboard clock line failure`
- `Keyboard controller failure`
- `Keyboard data line failure`
- `Keyboard stuck key failure`
- `No timer tick interrupt`
- `Shutdown failure`
- `Timer chip counter 2 failed`
- `Unexpected interrupt in protected mode`

Table 3-2. System Error Messages

Message	Definition	Probable Causes
`Address mark not found`	BIOS found faulty disk sector or could not find particular disk sector.	Faulty diskette/tape drive subsystem or hard-disk drive subsystem (defective system board).
`Attachment failed to respond`	Diskette drive or hard-disk drive controller cannot send data to associated drive.	Faulty interface cable or connector.
`Bad command or file name`	Command entered does not exist or is not in pathname specified.	Bad command.
`Bad error-correction code(ECC) on disk read` `Controller has failed`	Diskette drive or hard-disk drive controller detected uncorrectable read error. Hard-disk drive or associated controller defective.	Faulty diskette/tape drive subsystem or hard-disk drive subsystem (defective system board).
`Data error`	Computer received unrecoverable data-read error from diskette or hard-disk drive.	Faulty diskette, diskette drive, or hard-disk drive.
`Decreasing available memory`	Read/write failure during POST prevents system from using available memory.	One or more DIMMs faulty or improperly seated.
`Diskette drive 0 seek failure` `Diskette drive 1 seek failure`	Diskette/tape drive controller could not locate specific sector or track.	Faulty or improperly inserted diskette, incorrect configuration settings in System Setup program, loose diskette/tape drive interface cable, or loose power cable.
`Diskette read failure`	Failure occurred while system attempted to read diskette.	Faulty diskette, faulty or improperly connected diskette/tape drive interface cable, or loose power cable.

*Table 3-2. **System Error Messages** (continued)*

Message	Definition	Probable Causes
`Diskette subsystem reset failed`	System could not successfully issue reset command to diskette controller.	Faulty diskette/tape drive controller (defective system board).
`Diskette write protected`	Diskette write-protect feature activated.	Diskette write-protected.
`Drive not ready`	Diskette missing from or improperly inserted in diskette drive.	Defective, unformatted, or improperly inserted diskette.
`Gate A20 failure`	Gate A20 of the keyboard controller malfunctioned.	Faulty keyboard controller (defective system board).
`General failure`	Operating system cannot execute command.	Operating system corrupted or not installed properly.
`Hard disk controller failure` `Hard disk drive read failure` `Hard disk failure`	Hard-disk drive failed to initialize.	Incorrect configuration settings in System Setup program, improperly connected hard-disk drive cable, faulty hard-disk drive controller subsystem (defective system board), or loose power cable.
`Invalid configuration information - please run SETUP program`	System Setup program contains incorrect system configuration settings.	Incorrect configuration settings in System Setup program or faulty battery.
`Keyboard clock line failure` `Keyboard failure`	System cannot communicate with keyboard.	Keyboard cable connector loose or improperly connected, defective keyboard, or defective keyboard/mouse controller (defective system board).
`Keyboard controller failure`	Keyboard/mouse controller failed.	Defective keyboard/mouse controller (defective system board).

Table 3-2. System Error Messages *(continued)*

Message	Definition	Probable Causes
`Keyboard data line failure` `Keyboard stuck key failure`	System cannot communicate with keyboard.	Keyboard cable connector loose or improperly connected, defective keyboard, or defective keyboard/mouse controller (defective system board).
`Memory address line failure at` *`address`*`, read` *`value`* `expecting` *`value`* `Memory data line failure at` *`address`*`, read` *`value`* `expecting` *`value`* `Memory double word logic failure at` *`address`*`, read` *`value`* `expecting` *`value`* `Memory odd/even logic failure at` *`address`*`, read` *`value`* `expecting` *`value`* `Memory write/read failure at` *`address`*`, read` *`value`* `expecting` *`value`*	During memory test, value read at *`address`* was incorrect.	Faulty or improperly seated DIMMs or defective system board.
`Memory allocation error`	Software in use conflicts with operating system, application program, or utility.	Faulty application program or utility.
`Memory tests terminated by keystroke`	Memory test did not complete.	POST memory test terminated by pressing <Spacebar>.

Table 3-2. System Error Messages (continued)

Message	Definition	Probable Causes
`No boot device available`	System does not recognize diskette drive or hard-disk drive from which it is trying to boot.	Faulty diskette, diskette/tape drive subsystem, hard-disk drive, hard-disk drive subsystem, or no boot disk in drive A.
`No boot sector on hard-disk drive`	Configuration settings in System Setup program incorrect, or operating system corrupted.	Incorrect configuration settings in System Setup program, or no operating system on hard-disk drive.
`No timer tick interrupt`	Timer on system board malfunctioning.	Defective system board.
`Non-system disk or disk error`	Diskette in drive A, or hard-disk drive does not have bootable operating system installed on it.	Faulty diskette, diskette/tape drive subsystem, or hard-disk drive subsystem.
`Not a boot diskette`	No operating system on diskette.	No operating system on diskette.
`Plug and Play Configuration Error`	System encountered problem in trying to configure one or more expansion cards.	System resource conflict.
`Read fault`	MS-DOS cannot read from diskette or hard-disk drive.	Faulty diskette, diskette/tape drive subsystem, or hard-disk drive subsystem (defective system board).
`Requested sector not found`	System could not find particular sector on disk, or requested sector defective.	
`Reset failed`	Disk reset operation failed.	Improperly connected diskette/tape drive, hard-disk drive interface cable, or power cable.
`Sector not found`	MS-DOS unable to locate sector on diskette or hard-disk drive.	Defective sectors on diskette or hard-disk drive.

Table 3-2. System Error Messages *(continued)*

Message	Definition	Probable Causes
Seek error	MS-DOS unable to locate specific track on diskette or hard-disk drive.	Defective diskette or hard-disk drive.
Seek operation failed	System could not find particular address mark on disk.	Faulty diskette or hard-disk drive.
Shutdown failure	System board chip faulty.	Defective system board.
Time-of-day clock stopped	Backup battery low.	Defective battery or faulty chip (defective system board).
Time-of-day not set	Time or date setting in System Setup program incorrect, or system battery bad.	Incorrect Time or Date settings or defective system battery.
Timer chip counter 2 failed	Timer circuit on system board malfunctioning.	Defective system board.
Unexpected interrupt in protected mode	Keyboard/mouse controller malfunctioning, or one or more DIMMs improperly seated.	Improperly seated DIMMs or faulty keyboard/mouse controller chip (defective system board).
Write fault Write fault on selected drive	MS-DOS cannot write to diskette or hard-disk drive.	Faulty diskette or hard-disk drive.

Chapter 4
Removing and Replacing Parts on the Low-Profile Chassis

This chapter provides procedures for removing the components, assemblies, and subassemblies in the Dell OptiPlex GXi low-profile computer. If you are servicing a Dell OptiPlex GXi midsize or mini tower computer, use Chapter 5, “Removing and Replacing Parts on the Midsize Chassis,” or Chapter 6, “Removing and Replacing Parts on the Mini Tower Chassis.”

Unless otherwise noted, each procedure assumes the following:

- You have performed the steps in “Precautionary Measures” found later in this chapter.
- You have removed the computer cover.
- You can replace or reinstall a part by performing the removal procedure in reverse order unless additional information is provided.

Recommended Tools

Most of the procedures in this chapter require the use of one or more of the following tools:

- Small flat-blade screwdriver
- Wide flat-blade screwdriver
- #1 and #2 Phillips-head screwdrivers
- 1/4-inch nutdriver
- Tweezers or long-nose pliers

Also, use a wrist grounding strap as explained in the next section, “Precautionary Measures.”

Precautionary Measures

Before you perform any of the procedures in this chapter, take a few moments to read the following warning for your personal safety and to prevent damage to the system from ESD.

WARNING FOR YOUR PERSONAL SAFETY AND PROTECTION OF THE EQUIPMENT: Before you start to work on the system, perform the following steps in the sequence listed.

1. **Turn off the computer and any attached peripherals.**
2. **Disconnect the computer and any attached peripherals from their power sources to reduce the potential for personal injury. Also, disconnect any telephone or telecommunication lines from the computer.**
3. **Wear a wrist grounding strap, and clip it to an unpainted metal surface, such as the padlock loop on the back of the chassis. If a wrist grounding strap is not available, touch an unpainted metal surface on the back of the computer to discharge any static charge from your body.**

Computer Cover

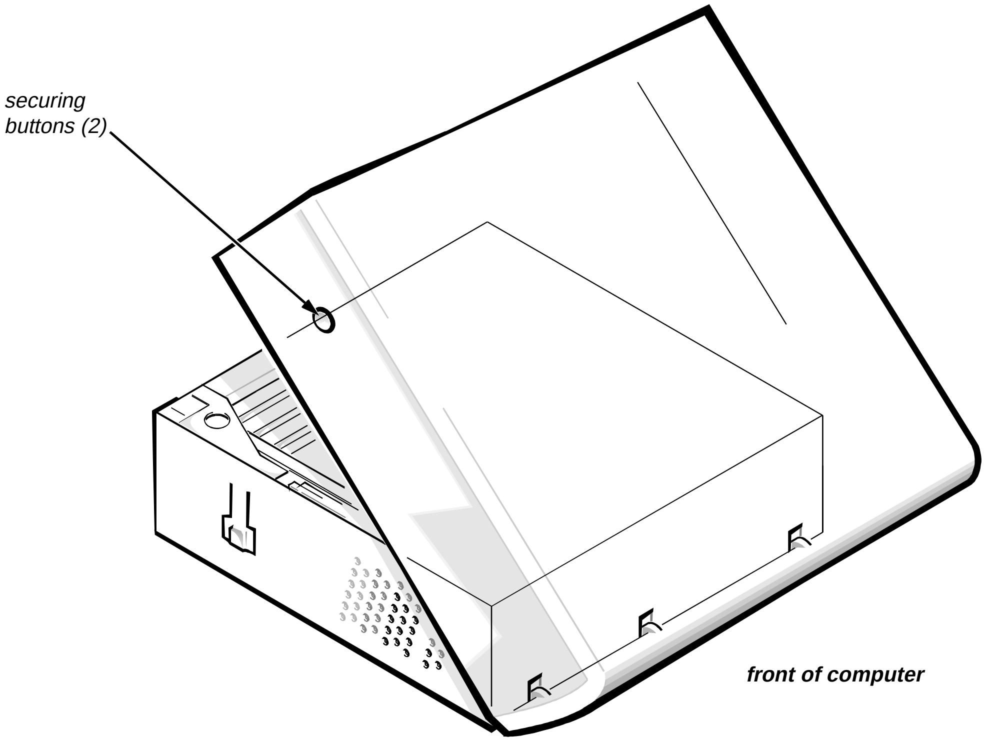


Figure 4-1. Computer Cover Removal

To remove the computer cover, follow these steps:

1. **Remove the padlock if one is installed.**
2. **Press in on the two securing buttons until the cover is free to swing up.**
3. **Raise the back of the cover and pivot it toward the front of the computer.**
4. **Lift the cover off of the hooks at the front of the chassis.**

   Three plastic hooks on the inside-front part of the cover secure it to the chassis.

Before you reinstall the cover, fold all cables out of the way so that they do not interfere with the cover or with the proper airflow inside the computer.

Eject, Power, and Reset Buttons

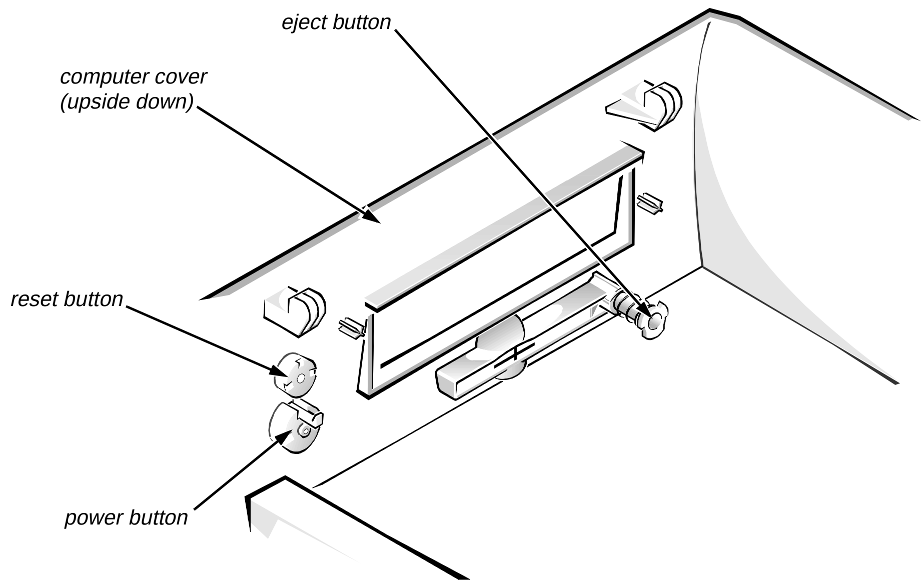


Figure 4-2. Eject, Power, and Reset Button Removal

To remove the eject, power, and reset buttons, follow these steps:

1. **Lay the computer cover upside down on a flat work surface, with the back of the cover facing you.**
2. **To remove the 3.5-inch diskette-drive eject button, pull gently on the plastic part of the button until it comes free.**
3. **To remove the power button or the reset button, use a small screwdriver and push in on the two or three plastic clips that hold the button to the computer cover.**

   When these clips are released, the button comes free from the front panel of the cover.

Front-Panel Inserts

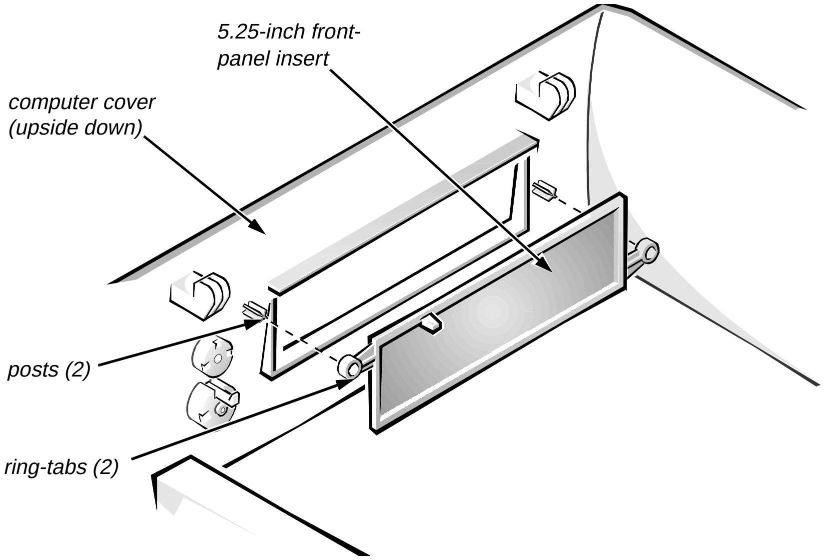


Figure 4-3. Front-Panel Insert Removal

To remove a front-panel insert, follow these steps:

1. **Lay the computer cover upside down on a flat work surface, with the front of the cover facing you.**
2. **From the front of the cover, use your thumbs to push inward on the insert until it slides off the two posts.**

To replace a front-panel insert, position the front-panel insert, then press the ring-tabs over the posts. If necessary, use a 1/4-inch nutdriver to help push on the ring-tabs.

Control Panel

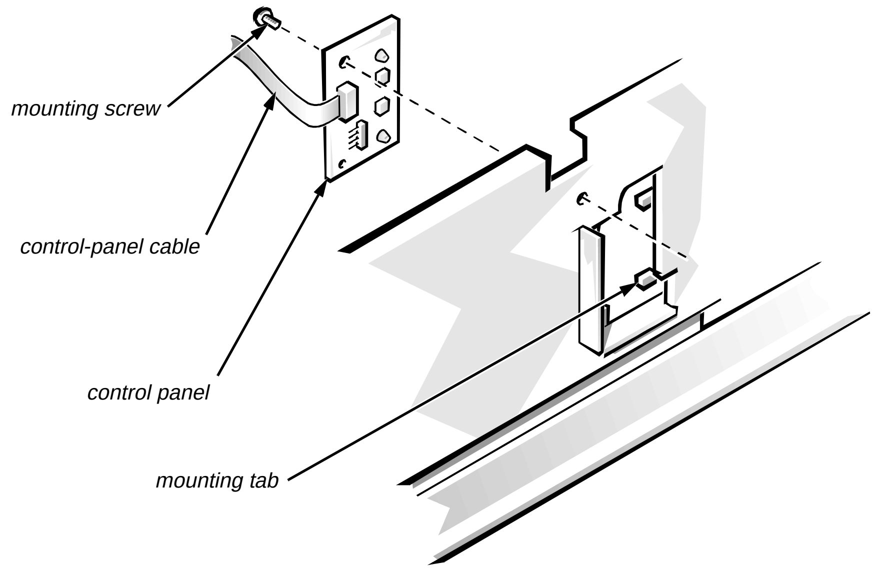


Figure 4-4. Control-Panel Removal

To remove the control panel, follow these steps:

1. **Disconnect the control-panel cable from the PANEL connector on the system board (see Figure 4-10).**
2. **From the inside of the chassis, remove the mounting screw holding the control panel to the chassis.**
3. **Remove the control panel from the chassis.**

   When you reinstall the control panel, be sure to put the right side of the control panel behind the mounting tab.

Drives

Figure 4-5 shows an example of drive hardware that can be installed in the computer. Refer to this figure when you perform any of the procedures in the following subsections.

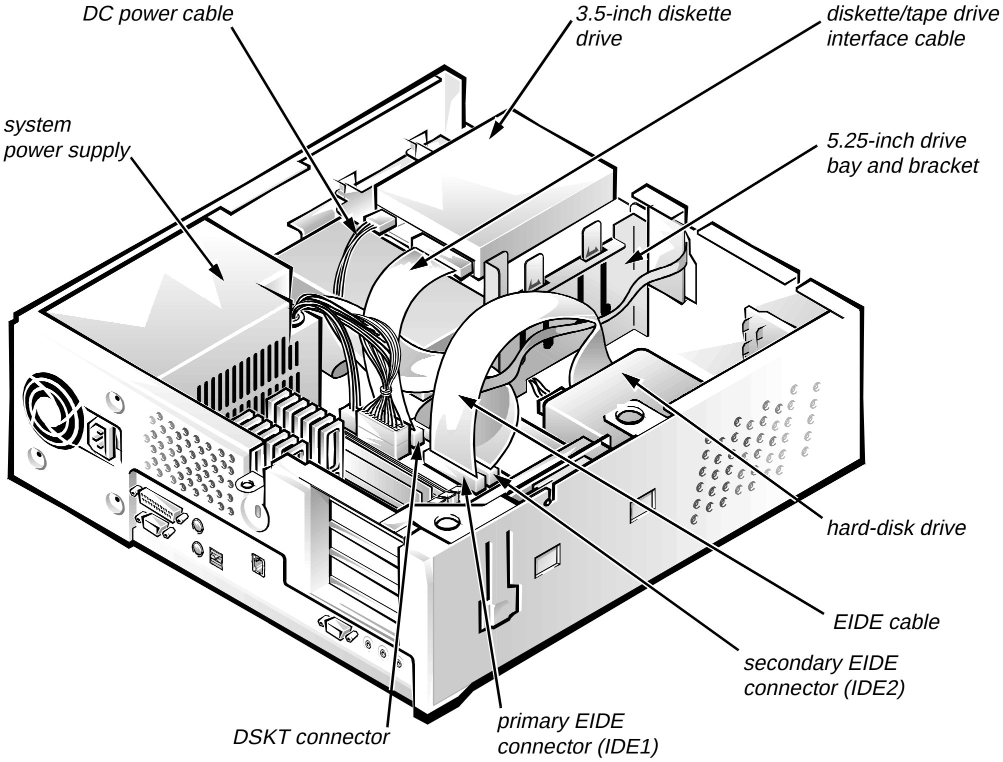


Figure 4-5. Drive Hardware

3.5-Inch Diskette Drive Assembly

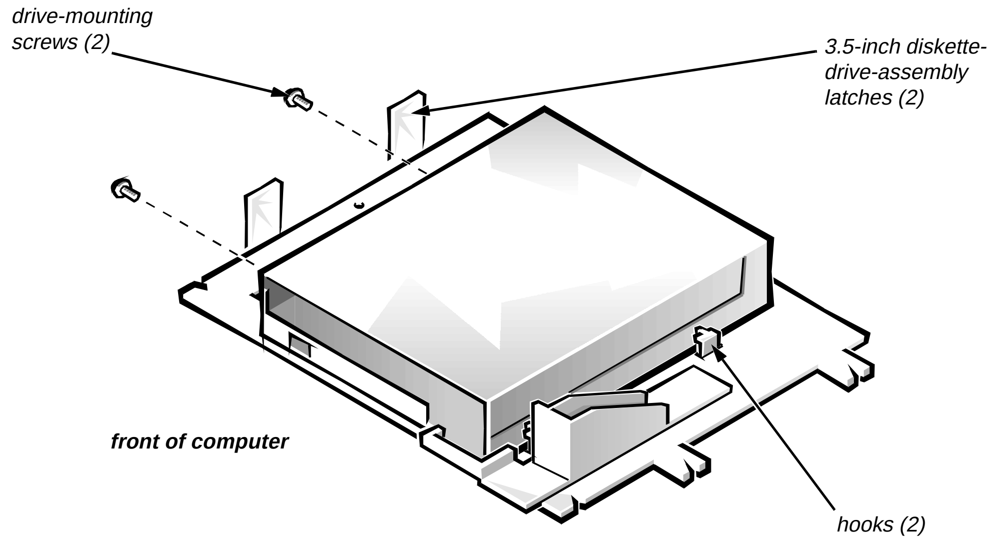


Figure 4-6. 3.5-Inch Diskette Drive Removal

To remove the 3.5-inch diskette drive assembly, follow these steps:

1. **Disconnect the DC power cable and the interface cable from the back of the diskette drive.**
2. **Press left on the two 3.5-inch diskette-drive-assembly latches to release the assembly.**

   Rotate the left side of the assembly up, and lift the assembly out of the chassis.
3. **Remove the two drive-mounting screws from the left side of the drive, and remove the drive from the bracket.**

When you replace the 3.5-inch diskette drive, be sure the mounting holes on the right side of the drive engage the two hooks on the bracket.

5.25-Inch Drive Assembly

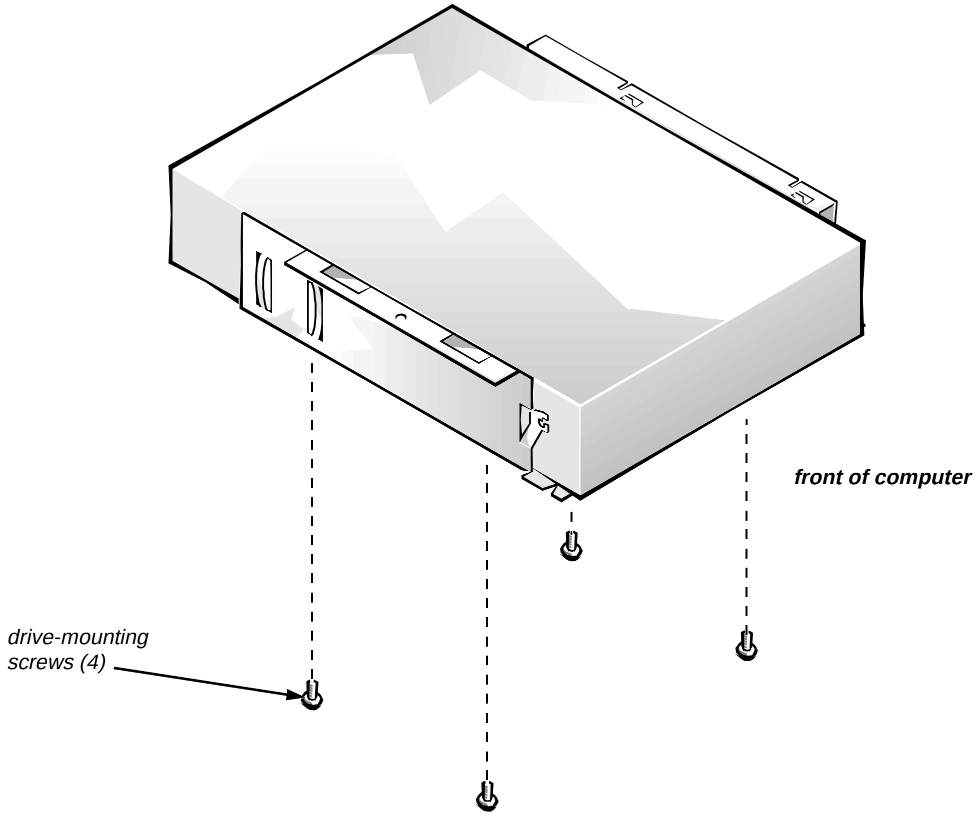


Figure 4-7. 5.25-Inch Drive Assembly Removal

To remove a 5.25-inch drive assembly, follow these steps:

1. **Remove the 3.5-inch diskette drive assembly.**
2. **Disconnect the DC power cable and the interface cable from the back of the 5.25-inch drive.**
3. **Lift the 5.25-inch drive assembly straight up and out of the chassis.**
4. **Lay the 5.25-inch drive assembly upside down, then remove the four screws attaching the drive to the bracket.**

When you replace the 5.25-inch drive, place the front of the drive toward the front of the bracket; then install the four screws but do not tighten them. Align the screws with the score marks on the bracket, and tighten the screws in the order stamped on the bottom of the bracket.

Check the alignment of the computer cover around the 5.25-inch drive bezel. Adjust the drive forward or backward on the bracket to align it.

Hard-Disk Drive Assembly

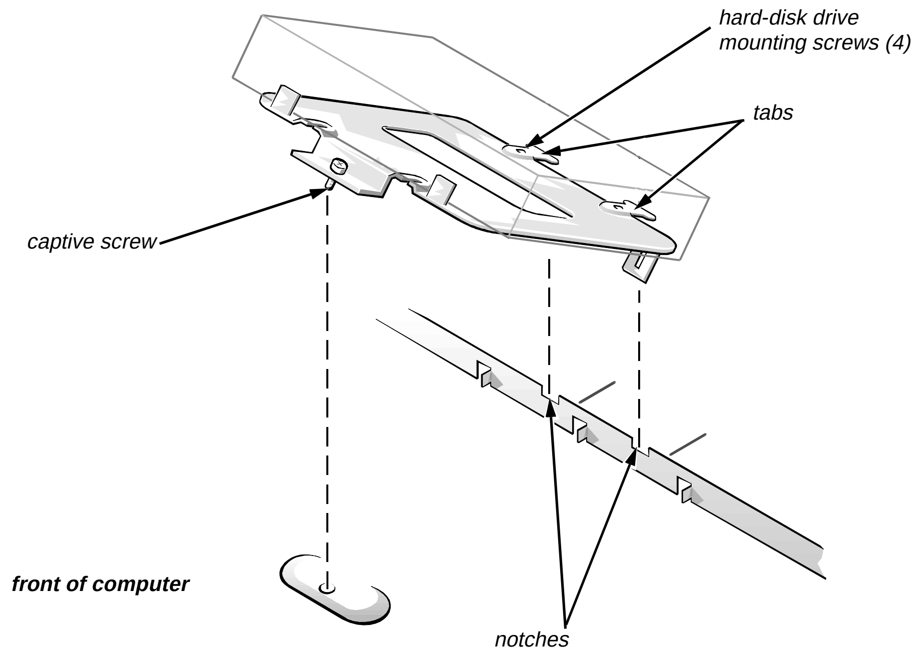


Figure 4-8. Hard-Disk Drive Assembly Removal

To remove the hard-disk drive, follow these steps:

1. **Disconnect the DC power cable and the interface cable from the back of the drive.**
2. **Loosen the captive screw that secures the hard-disk drive bracket to the chassis.**
3. **Pivot the hard-disk drive assembly up, then lift it out of the chassis.**
4. **Remove the four hard-disk drive mounting screws that attach the hard-disk drive to the hard-disk drive bracket.**

When you reinstall the hard-disk drive assembly, be sure the tabs on the back of the mounting plate fully engage in the notches on the chassis before you rotate the assembly into place.

System Power Supply

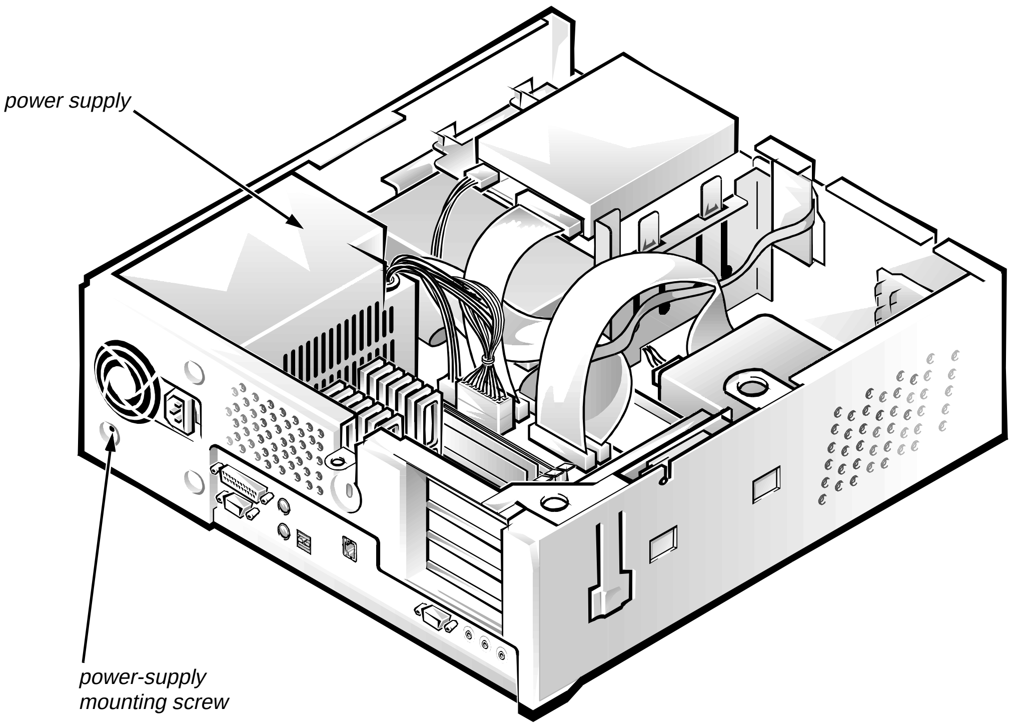


Figure 4-9. System Power-Supply Removal

To remove the system power supply, follow these steps:

1. **Disconnect the AC power cable from the back of the power supply.**
2. **Disconnect the DC power cables from the system board and the drives.**
3. **Remove the power-supply mounting screw at the back of the chassis.**
4. **Slide the system power supply forward until it stops; then lift it from the chassis.**

When you replace the system power supply, place it down inside the chassis and against the right side of the chassis. Then slide the system power supply toward the back of the chassis, and hook the tabs into the right side of the power supply.

System Board Components

The subsections that follow Figure 4-10 contain procedures for removing system board and riser board components.

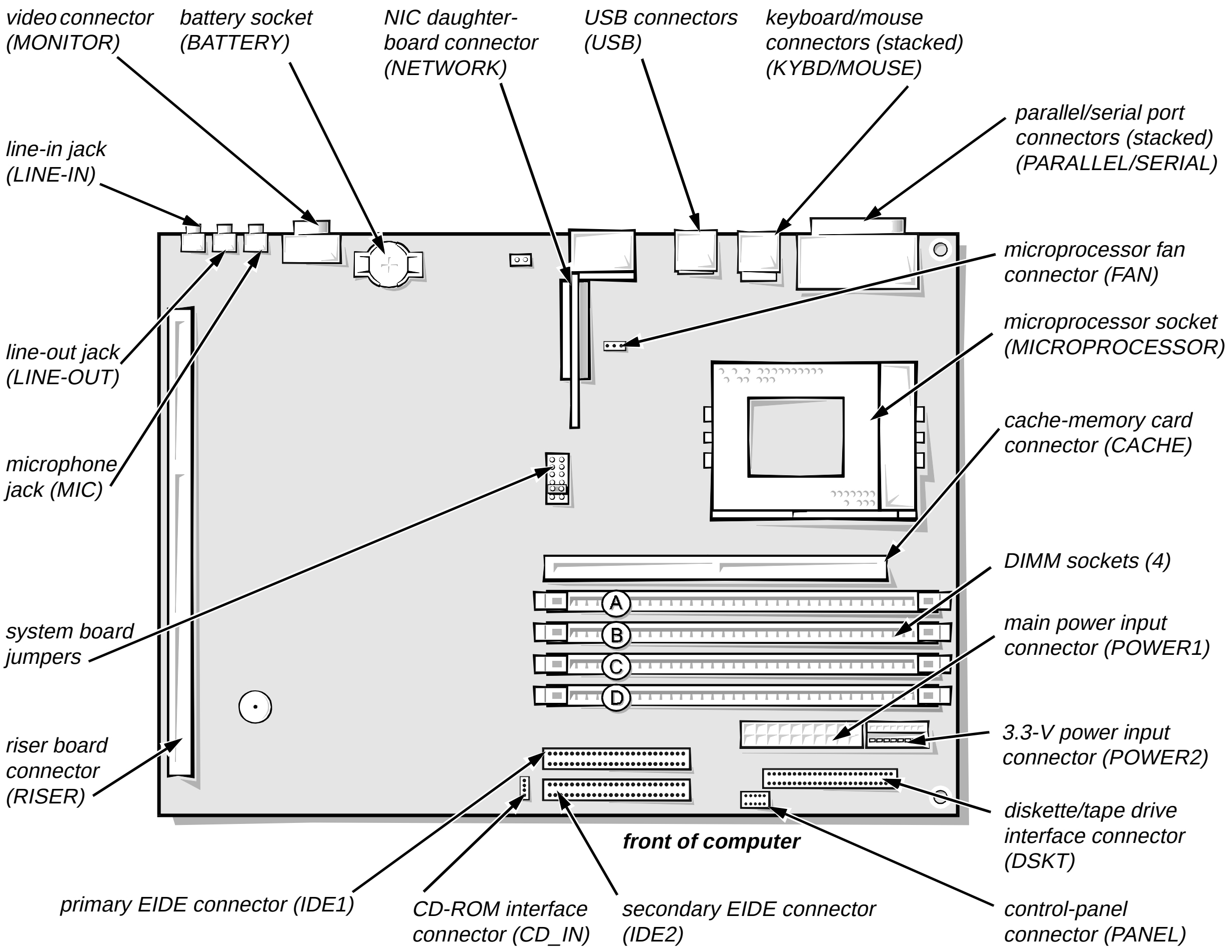


Figure 4-10. System Board Components

Expansion Cards

The computer has a removable expansion-card cage. The expansion-card cage contains the riser board and any installed expansion cards. Dell recommends that you remove the expansion-card cage first before removing or installing expansion cards.

If you are not removing any of the expansion cards, leave the external cables attached to the expansion cards.

Expansion-Card Cage

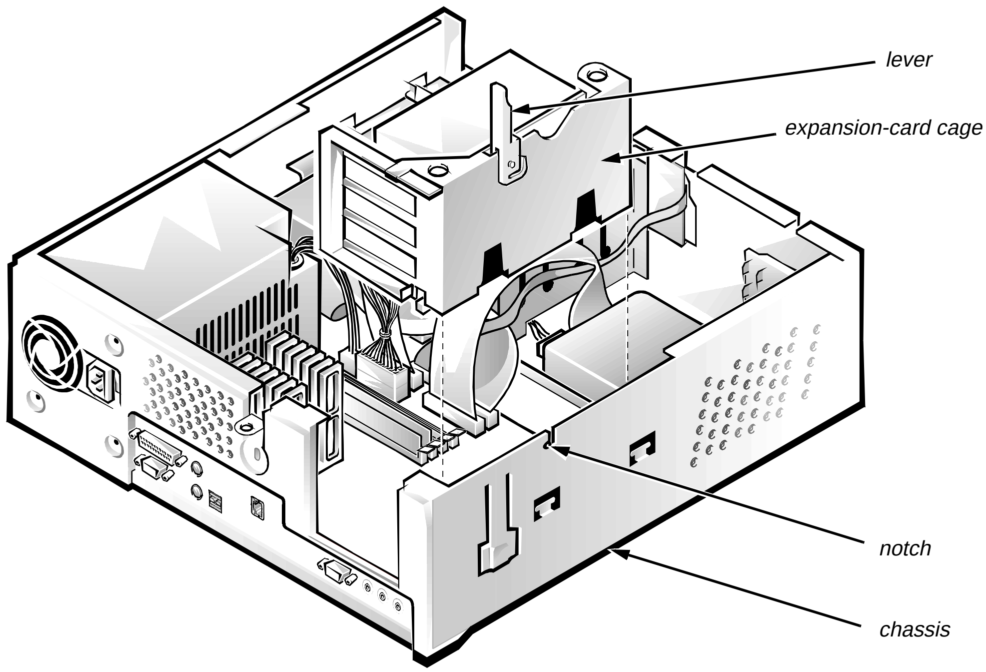


Figure 4-11. Expansion-Card Cage Removal

To remove an expansion-card cage, follow these steps:

1. **Rotate the lever toward the back of the computer until it stops in the upright position.**
2. **Lift the expansion-card cage up and away from the computer.**

To replace an expansion-card cage, keep it flush against the chassis to ensure that the lever engages the notch in the chassis when the lever is depressed.

Expansion Card

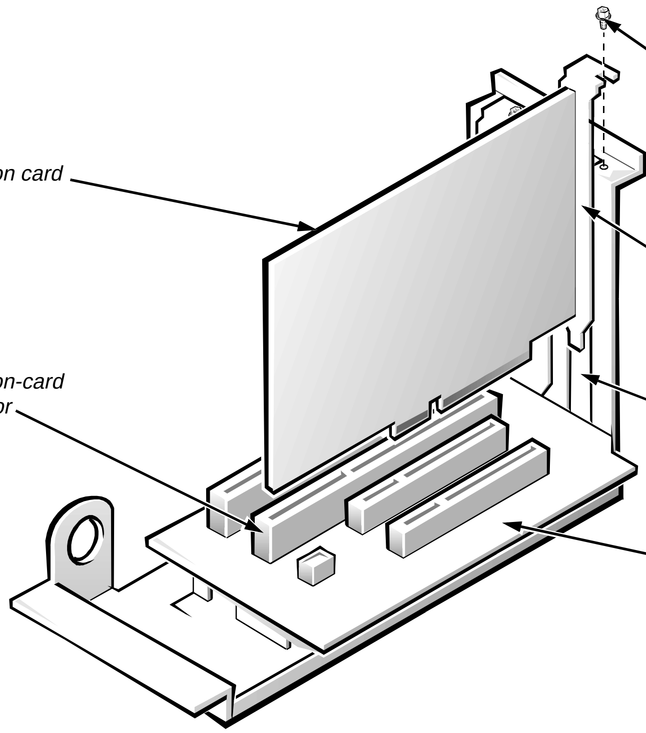


Figure 4-12. Expansion-Card Removal

To remove an expansion card, follow these steps:

1. **Disconnect any external cables from the expansion card being removed.**
2. **Remove the expansion-card cage.**
3. **Remove the retaining screw from the card-mounting bracket.**
4. **Grasp the expansion card by its corners, and carefully remove it from the expansion-card connector.**

Riser Board

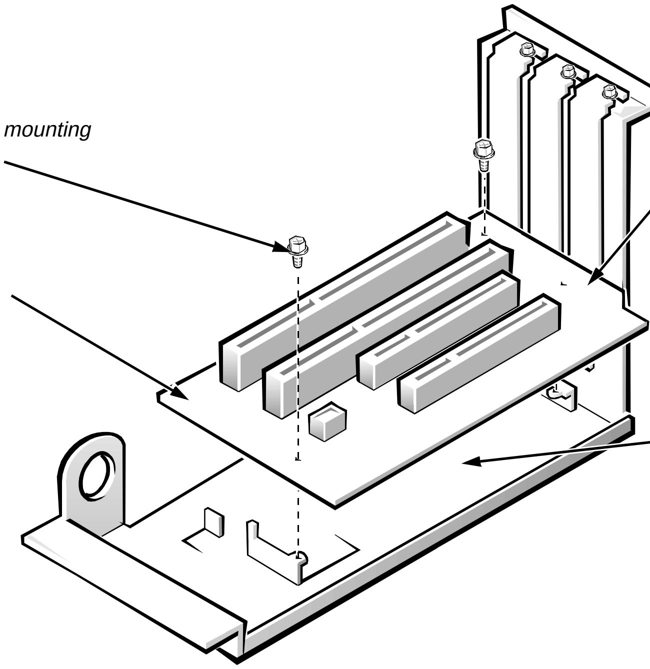


Figure 4-13. Riser Board Removal

To remove the riser board, follow these steps:

1. **Remove the expansion-card cage and all expansion cards.**
2. **Lay the expansion-card cage on a flat work surface with the riser board facing up.**
3. **Remove the two riser-board mounting screws.**
4. **Lift the riser board away from the expansion-card cage.**

When you replace the riser board, be sure the alignment feature on the expansion-card cage engages with the alignment slot.

DIMMs

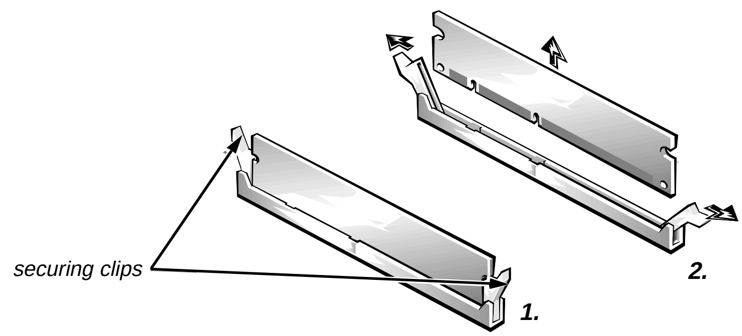


Figure 4-14. DIMM Removal

To remove a DIMM, push outward on the DIMM socket's securing clips until the DIMM is released from its socket. Lift the DIMM away from the socket.

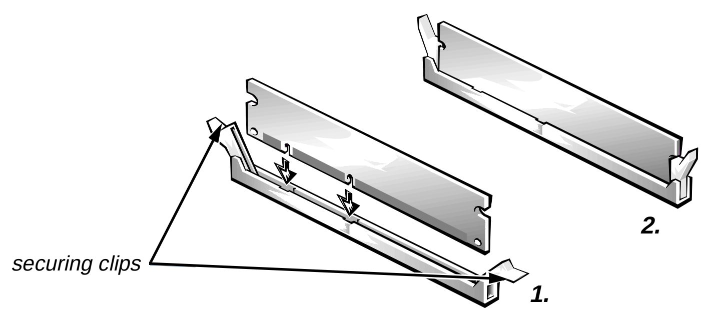


Figure 4-15. DIMM Installation

To replace a DIMM, press the DIMM fully into the socket while closing the securing clips to lock the DIMM into the socket.

Cache Memory Card

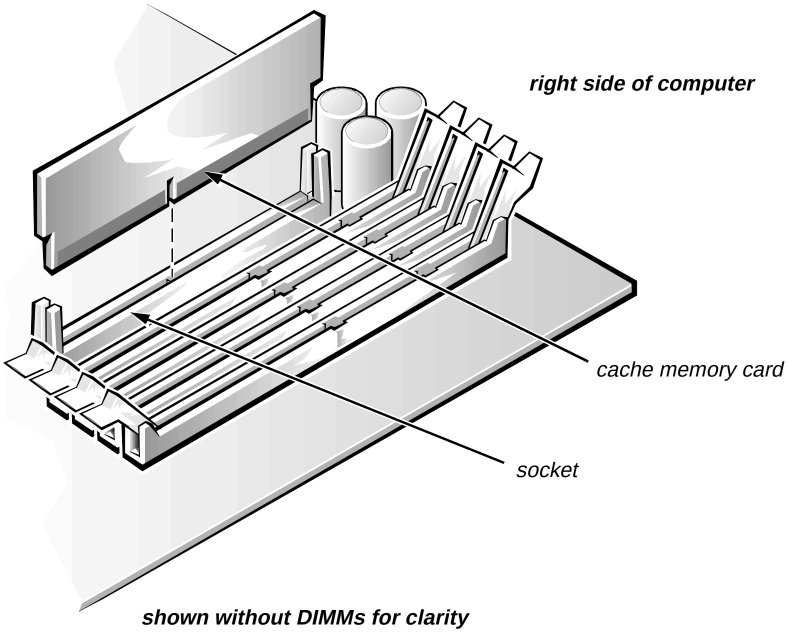


Figure 4-16. Cache-Memory Card Removal

To remove the cache memory card, rock the cache memory card from side to side while pulling up on it. Take note of which end of the cache memory card is the pin-1 end (nearest the right side of the system board).

When you replace the cache memory card, be sure that the pin-1 end of the cache memory card (which has a *1* etched near the connector) is toward the right side of the system board.

NIC Daughter Board

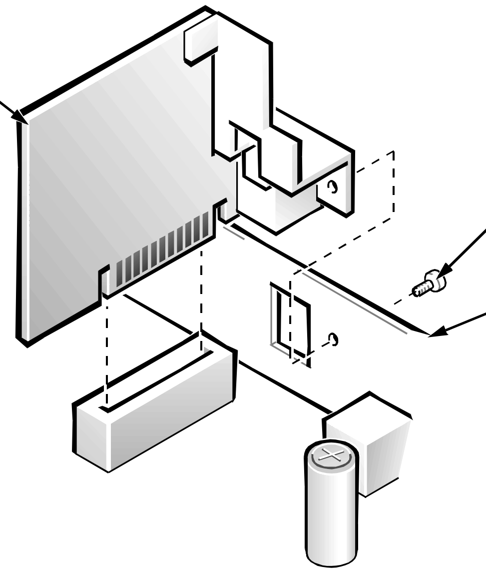


Figure 4-17. NIC Daughter-Board Removal

To remove the NIC daughter board, do the following:

1. **Remove the NIC daughter-board mounting screw.**
2. **Pull straight up on the NIC daughter board.**

Microprocessor/Heat Sink Assembly

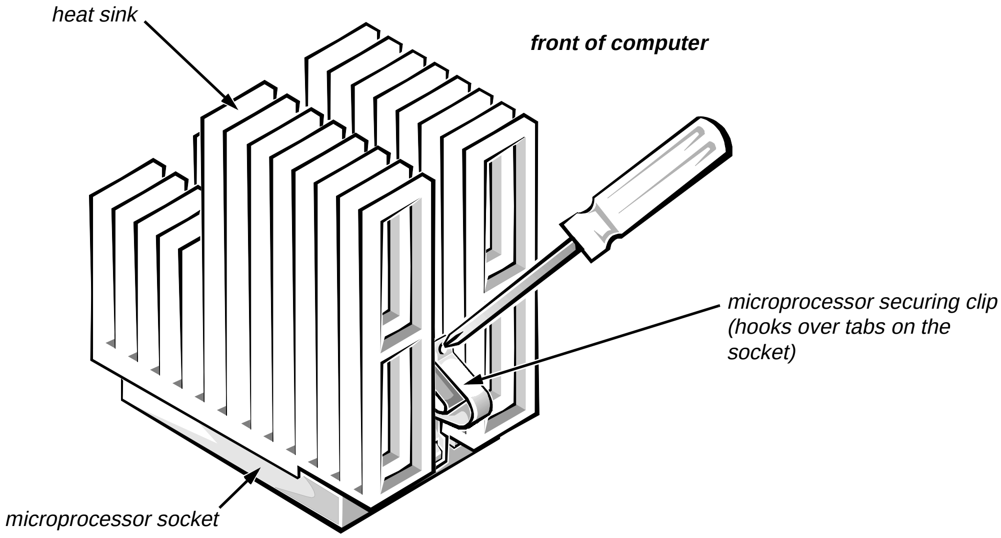


Figure 4-18. Microprocessor Securing-Clip Removal

To remove the microprocessor/heat sink assembly, follow these steps:

1. **Remove the microprocessor securing clip from the microprocessor/heat sink assembly.**

   > **WARNING: The microprocessor chip can get extremely hot during system operations. Be sure the chip has had sufficient time to cool before touching it.**

   Press down on the folded part of the clip with a small screwdriver to release the clip.

2. **Push outward and then upward on the microprocessor-socket release lever to rotate the lever to its fully vertical position (see Figure 4-19).**

3. **Lift the microprocessor/heat sink assembly out of its socket.**

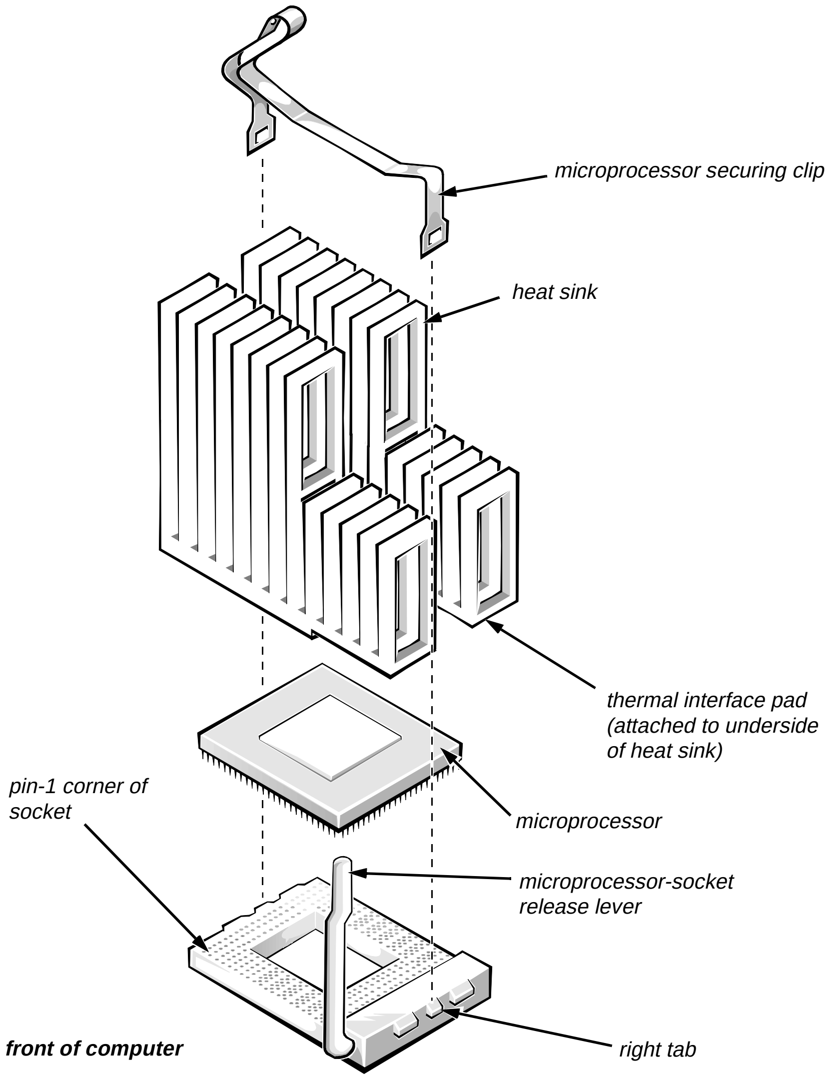


Figure 4-19. Microprocessor Removal

If the heat sink and microprocessor are separate, look at the bottom side of the heat sink, and peel the thermal-pad protective cover off before attaching the heat sink to the microprocessor.

To install the replacement microprocessor/heat sink assembly, ensure that the microprocessor-socket release lever is in its fully vertical position to allow the microprocessor pins to easily slip into the socket. When the microprocessor/ heat sink assembly is in place, rotate the microprocessor-socket release lever to its horizontal position. Hook the microprocessor securing clip over the socket tab nearest the right side of the system board, and then snap it over the tab on the opposite side of the socket.

NOTE: Pin 1 on the microprocessor is located on the corner with the largest bevel. The pin-1 hole in the microprocessor socket is located on the corner where the holes are in a diagonal pattern.

System Battery

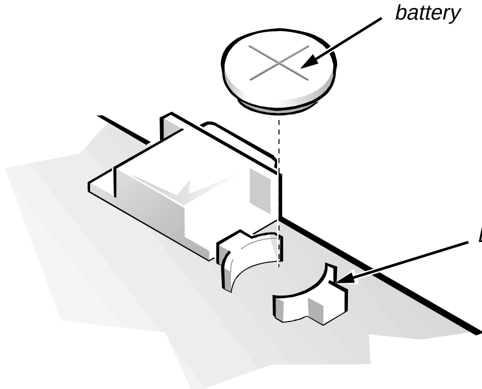


Figure 4-20. System Battery Removal

WARNING: There is a danger of the new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

To remove the system battery, follow these steps:

1. **If possible, enter the System Setup program, and make a printed copy of the System Setup screens.**
2. **Remove the expansion-card cage.**
3. **Remove the battery.**

   Carefully pry the battery out of its socket with your fingers or with a blunt, nonconducting object, such as a plastic screwdriver.

When you replace the system battery, orient the new battery with the "+" facing up. Insert the battery into its socket and snap it into place.

System Board

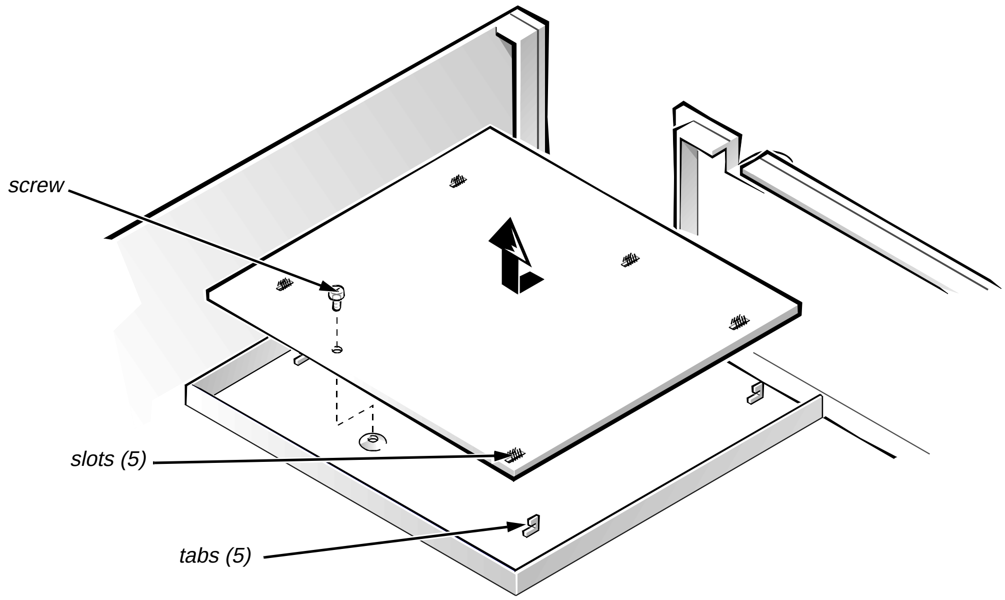


Figure 4-21. System Board Removal

To remove the system board, follow these steps:

1. **Disconnect all cables from their connectors at the back of the computer.**
2. **Remove the expansion-card cage.**
3. **Disconnect all cables from the system board.**
4. **Remove the screw that secures the system board to the bottom of the chassis.**
5. **Slide the system board toward the front of the chassis until it stops.**
6. **Carefully lift the system board out of the chassis (be sure to lift evenly and not twist the system board).**

If you are replacing a system board, remove the DIMMs, the cache memory card, the NIC daughter board, and the microprocessor from the old system board and install them on the replacement board.

When you reinstall the system board, before you slide the system board back to lock it in position, push down near each slot to engage the grounding clip onto its corresponding tab. Push evenly on both sides of the system board as you slide it into position (do not twist the system board).

Chapter 5
Removing and Replacing Parts on the Midsize Chassis

This chapter provides procedures for removing the components, assemblies, and subassemblies in the Dell OptiPlex GXi midsize computer. If you are servicing a Dell OptiPlex GXi low-profile or mini tower computer, use Chapter 4, “Removing and Replacing Parts on the Low-Profile Chassis,” or Chapter 6, “Removing and Replacing Parts on the Mini Tower Chassis.”

Unless otherwise noted, each procedure assumes the following:

- You have performed the steps in “Precautionary Measures” found later in this chapter.
- You have removed the computer cover.
- You can replace or reinstall a part by performing the removal procedure in reverse order unless additional information is provided.

Recommended Tools

Most of the procedures in this chapter require the use of one or more of the following tools:

- Small flat-blade screwdriver
- Wide flat-blade screwdriver
- #1 and #2 Phillips-head screwdrivers
- 1/4-inch nutdriver
- Tweezers or long-nose pliers

Also, use a wrist grounding strap as explained in the next section, “Precautionary Measures.”

Precautionary Measures

Before you perform any of the procedures in this chapter, take a few moments to read the following warning for your personal safety and to prevent damage to the system from ESD.

WARNING FOR YOUR PERSONAL SAFETY AND PROTECTION OF THE EQUIPMENT: Before you start to work on the system, perform the following steps in the sequence listed.

1. **Turn off the computer and any attached peripherals.**
2. **Disconnect the computer and any attached peripherals from their power sources to reduce the potential for personal injury. Also, disconnect any telephone or telecommunication lines from the computer.**
3. **Wear a wrist grounding strap, and clip it to an unpainted metal surface, such as the padlock loop on the back of the chassis. If a wrist grounding strap is not available, touch any unpainted metal surface on the back of the computer to discharge any static charge from your body.**

Floor Stand

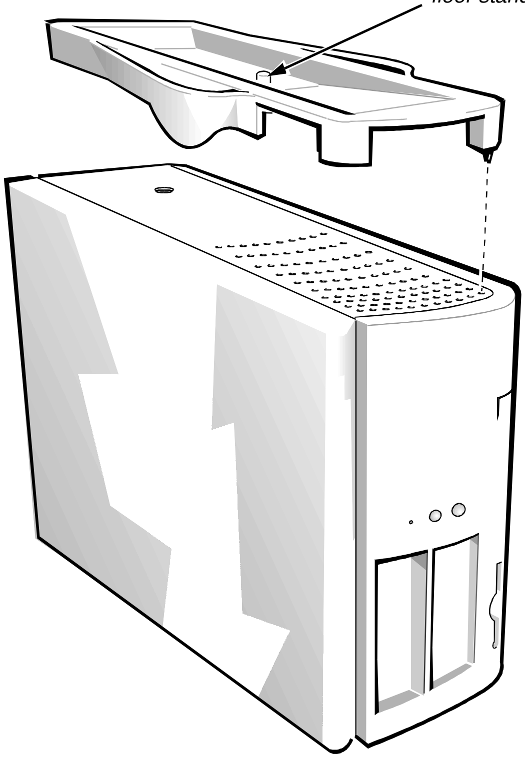


Figure 5-1. Floor Stand Removal

To remove the floor stand, follow these steps:

1. **Place the right side of the computer on a flat work surface.**
2. **Unscrew the floor stand screw.**

   Use your fingers or a wide flat-blade screwdriver to unscrew the floor stand screw.
3. **Pull the floor stand away from the computer.**

   Disengage the three orientation nubs that position and help hold the floor stand to the computer.

Computer Cover

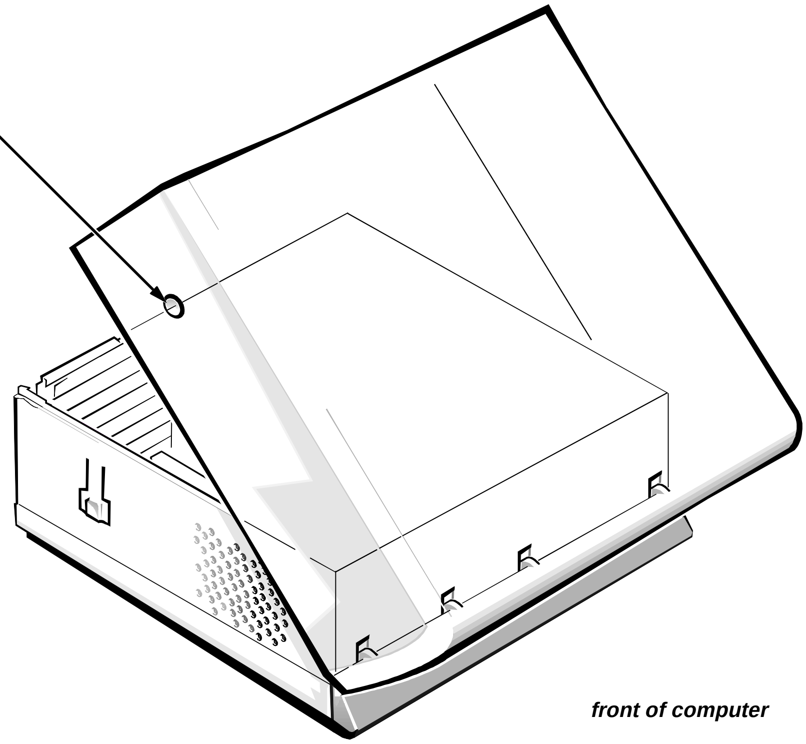


Figure 5-2. Computer Cover Removal

To remove the computer cover, follow these steps:

1. **Remove the padlock if one is installed.**
2. **Press in on the two securing buttons until the cover is free to swing up.**
3. **Raise the back of the cover and pivot it toward the front of the computer.**
4. **Lift the cover off the hooks at the front of the chassis.**

   Four plastic hooks on the inside-front part of the cover secure it to the chassis.

Before you reinstall the cover, fold all cables out of the way so that they do not interfere with the cover or with the proper airflow inside the computer.

Eject, Power, and Reset Buttons

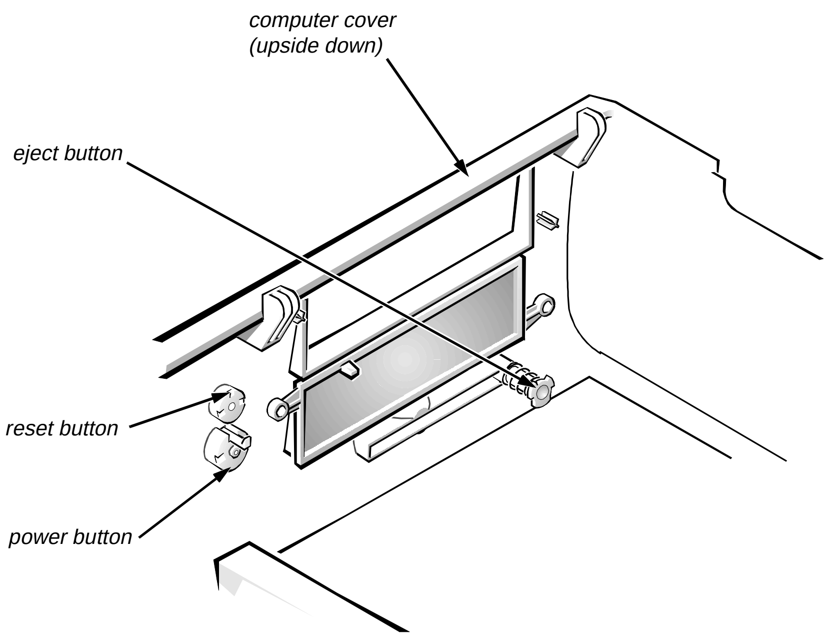


Figure 5-3. Eject, Power, and Reset Button Removal

To remove the eject, power, and reset buttons, follow these steps:

1. **Lay the computer cover upside down on a flat work surface, with the back of the cover facing you.**
2. **To remove the 3.5-inch diskette-drive eject button, pull gently on the plastic part of the button until it comes free.**
3. **To remove the power button or the reset button, use a small screw-driver and push in on the two or three plastic clips that hold the button to the computer cover.**

   When these clips are released, the button comes free from the front panel of the cover.

Front-Panel Inserts

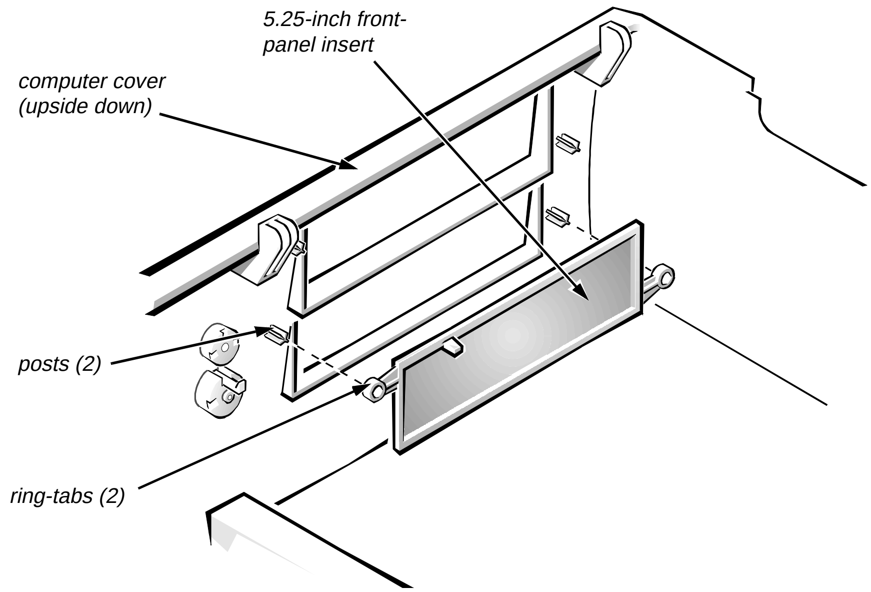


Figure 5-4. Front-Panel Insert Removal

To remove a front-panel insert, follow these steps:

1. **Lay the computer cover upside down on a flat work surface, with the front of the cover facing you.**
2. **From the front of the cover, use your thumbs to push inward on the insert until it slides off the two posts.**

To replace a front-panel insert, position the front-panel insert, then press the ring-tabs over the posts. If necessary, use a 1/4-inch nutdriver to help push on the ring-tabs.

Control Panel

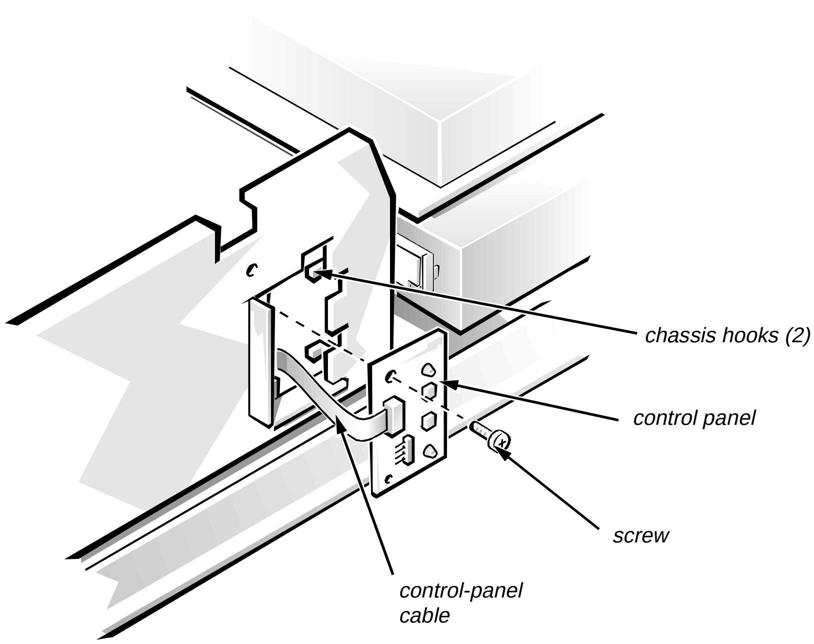


Figure 5-5. Control-Panel Removal

To remove the control panel, follow these steps:

1. **Remove the hard-disk drive bracket.**
2. **Disconnect the control-panel cable from the PANEL connector on the system board (see Figure 5-13).**
3. **Remove the mounting screw holding the control panel to the chassis.**
4. **Slide the control panel out of the hooks holding it to the chassis.**

   Note the routing of the control-panel cable as you remove it from the chassis.

Drives

Figure 5-6 shows an example of drive hardware that can be installed in the computer. Refer to this figure when you perform any of the procedures in the following subsections.

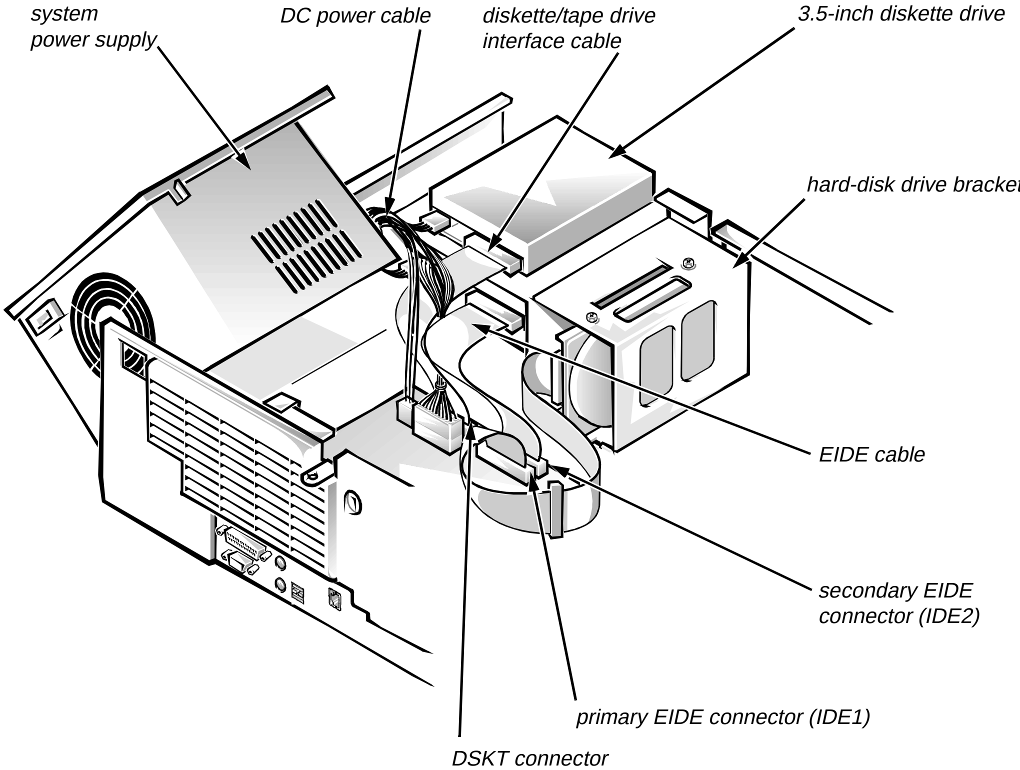


Figure 5-6. Drive Hardware

Externally Accessible Drive Assemblies

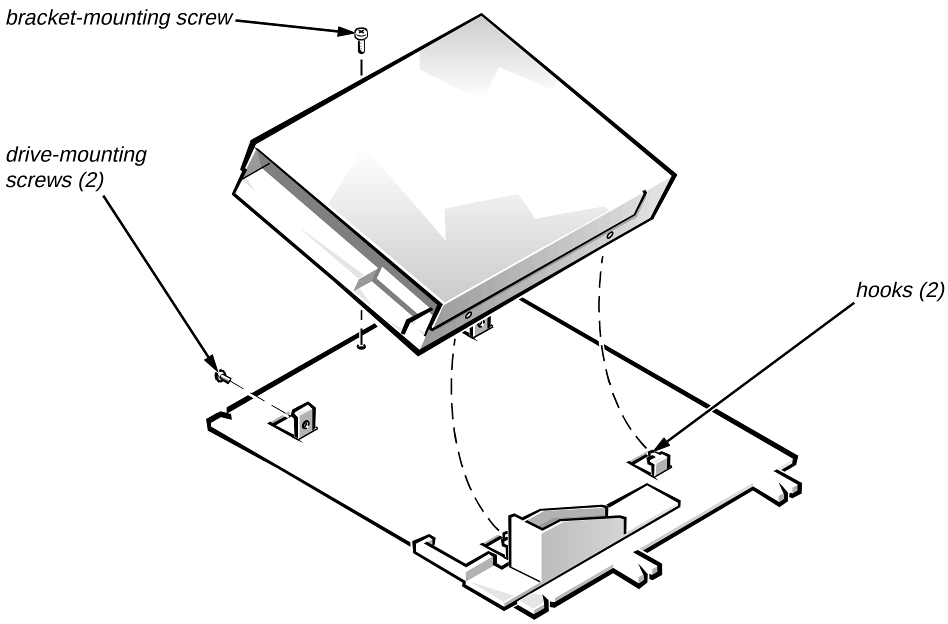


Figure 5-7. 3.5-Inch Diskette Drive Removal

To remove the 3.5-inch diskette drive, follow these steps:

1. **Disconnect the DC power cable and the interface cable from the back of the 3.5-inch diskette drive.**
2. **Remove the bracket-mounting screw.**
3. **Rotate the left side of the 3.5-inch diskette drive assembly up, and lift the assembly out of the chassis.**
4. **Remove the two drive-mounting screws from the left side of the drive, and remove the drive from the bracket.**

When you replace the 3.5-inch diskette drive, be sure the two hooks on the right side of the bracket engage the mounting holes in the side of the 3.5-inch diskette drive.

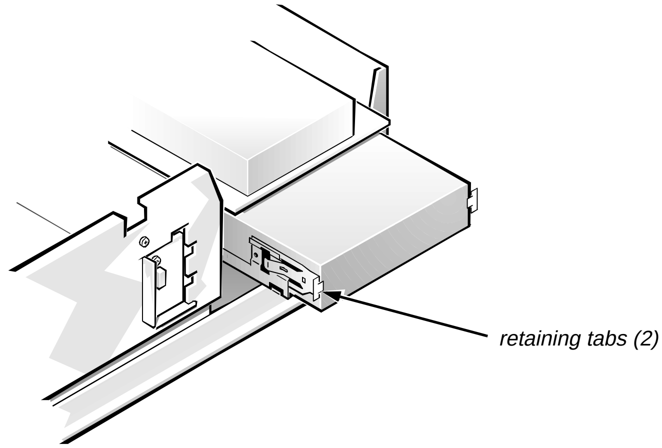


Figure 5-8. 5.25-Inch Drive Assembly Removal

To remove a 5.25-inch drive assembly from the middle or lower drive bay, follow these steps:

1. **Disconnect the DC power cable and the interface cable from the back of the drive.**
2. **Press in on the two retaining tabs (one on each side of the drive), and slide the drive assembly forward to remove it.**
3. **Remove the four screws attaching the 5.25-inch drive to the mounting plate, and lift the drive out of the mounting plate (see Figure 5-9).**

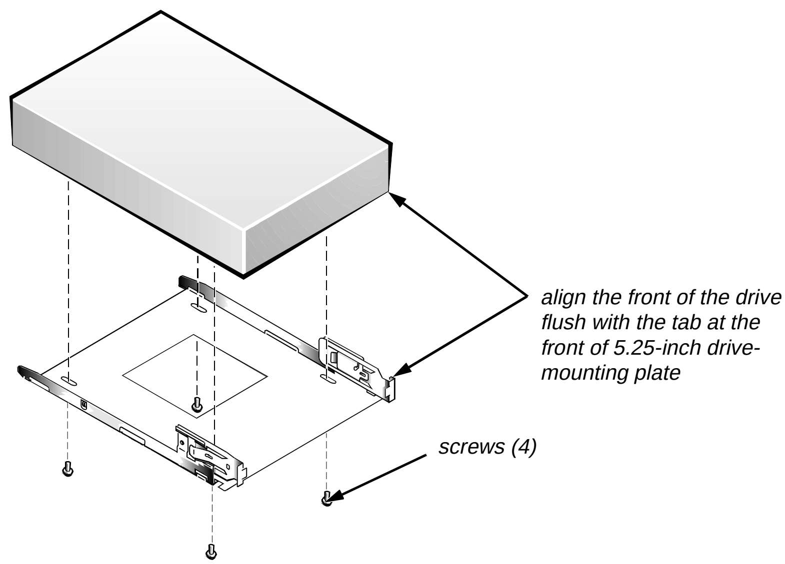


Figure 5-9. 5.25-Inch Drive Removal

When you replace the 5.25-inch drive, align the front of the drive flush with the tab at the front of the mounting plate. Insert the four screws, and tighten them in the order stamped on the bottom of the 5.25-inch drive-mounting plate.

Hard-Disk Drive Bracket

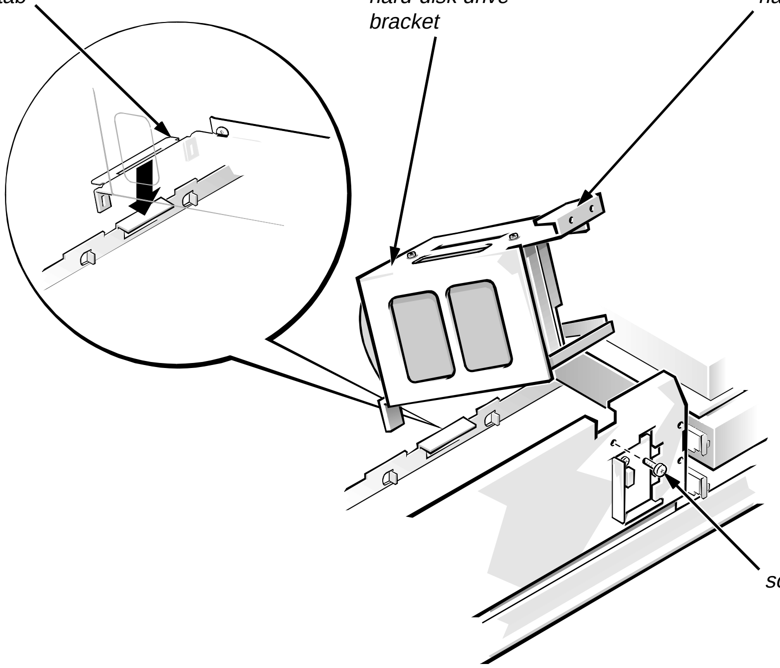


Figure 5-10. Hard-Disk Drive Bracket Removal

To remove the hard-disk drive bracket, follow these steps:

1. **Disconnect the DC power cable and the interface cable from the back of each hard-disk drive installed in the hard-disk drive bracket.**
2. **Remove the screw that secures the hard-disk drive bracket to the front of the chassis.**
3. **Grasp the handle on the front of the bracket, and rotate the front of the bracket up until the hooks are free from the chassis.**
4. **Lift the hard-disk drive bracket out of the computer.**

When you reinstall the hard-disk drive bracket, place the lower-back tab of the hard-disk drive bracket into position (be sure that the opening in the lower-back tab is over the alignment tab on the chassis); then rotate the front of the bracket down into position.

Hard-Disk Drive

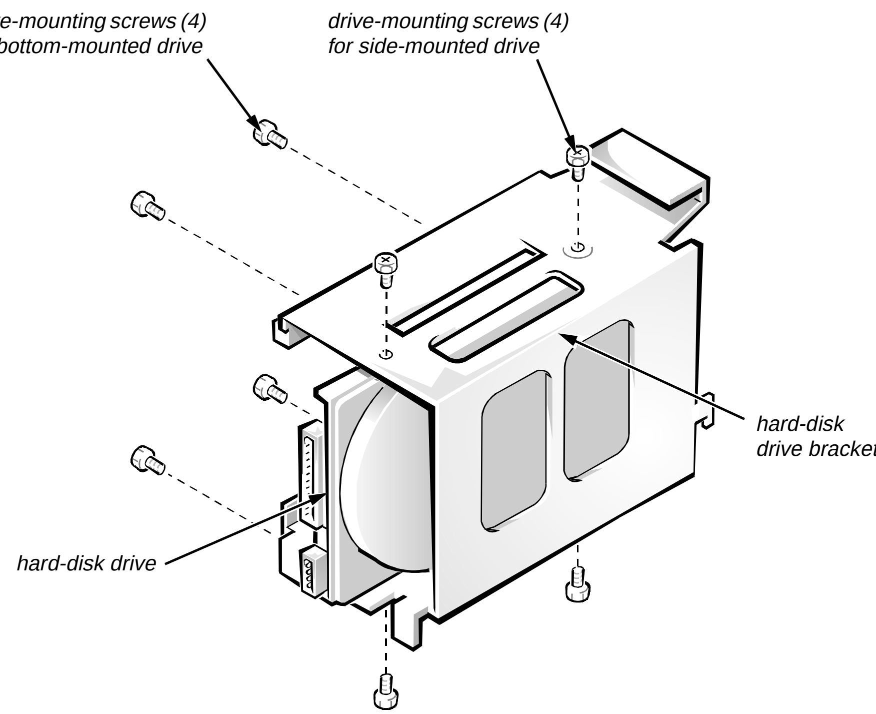


Figure 5-11. Hard-Disk Drive Removal

To remove a hard-disk drive, follow these steps:

1. **Remove the hard-disk drive bracket.**
2. **Remove the four screws that attach the hard-disk drive to the hard-disk drive bracket.**

   One hard-disk drive attaches to the hard-disk drive bracket at the sides of the drive. The other hard-disk drive attaches to the hard-disk drive bracket at the bottom of the hard-disk drive.

3. **Slide the drive out of the hard-disk drive bracket.**

System Power Supply

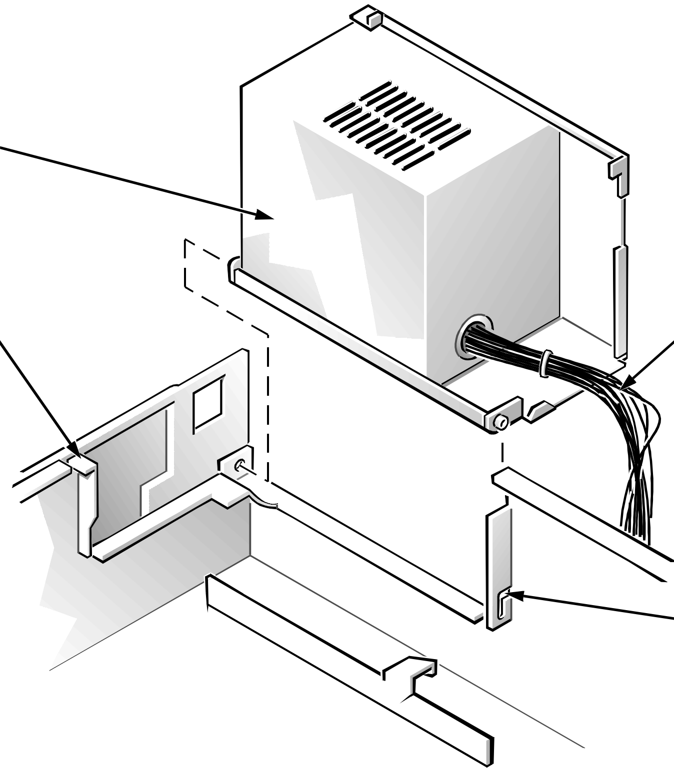


Figure 5-12. System Power-Supply Removal

To remove the system power supply, follow these steps:

1. **Disconnect the AC power cable from the back of the power supply.**
2. **Free the system power supply from the securing tab labeled "RELEASE —>," and rotate it to the right until it stops.**

   Press the securing tab to the left to release the power supply.
3. **Disconnect the DC power cables from the system board and the drives.**
4. **Lift the front end of the system power supply up, and move it to the right to disengage the power supply from the slot in the chassis.**
5. **Lift the system power supply from the computer.**

System Board Components

The subsections that follow Figure 5-13 contain procedures for removing system board components.

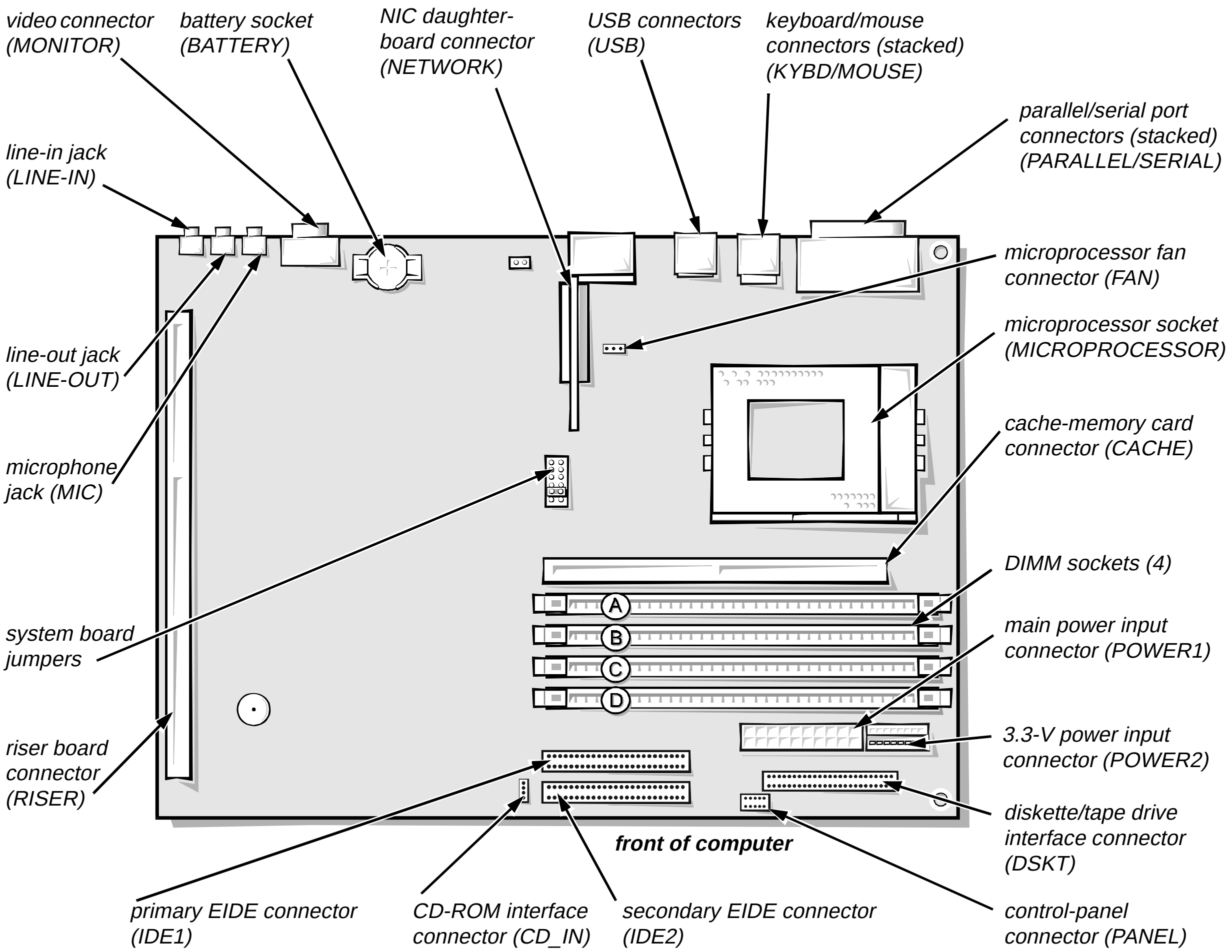


Figure 5-13. System Board Components

Expansion Cards

The computer has a removable expansion-card cage. The expansion-card cage contains the riser board and any installed expansion cards. Dell recommends that you remove the expansion-card cage first before removing or installing expansion cards.

If you are not removing any of the expansion cards, leave the external cables attached to the expansion cards.

Expansion-Card Cage

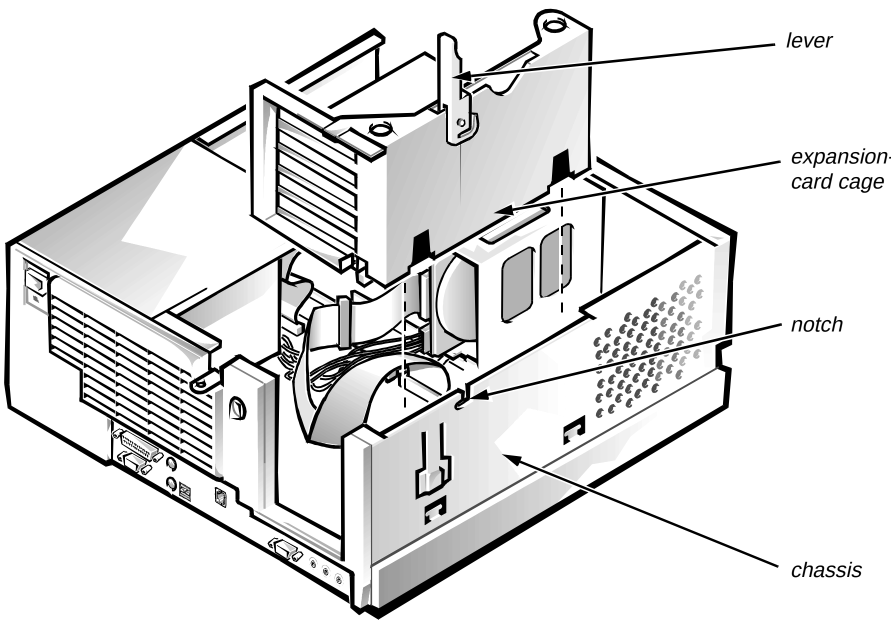


Figure 5-14. Expansion-Card Cage Removal

To remove an expansion-card cage, follow these steps:

1. **Rotate the lever toward the back of the computer until it stops in the upright position.**
2. **Lift the expansion-card cage up and away from the computer.**

To replace an expansion-card cage, keep the cage flush against the chassis to ensure that the lever engages the notch when the lever is depressed.

Expansion Card

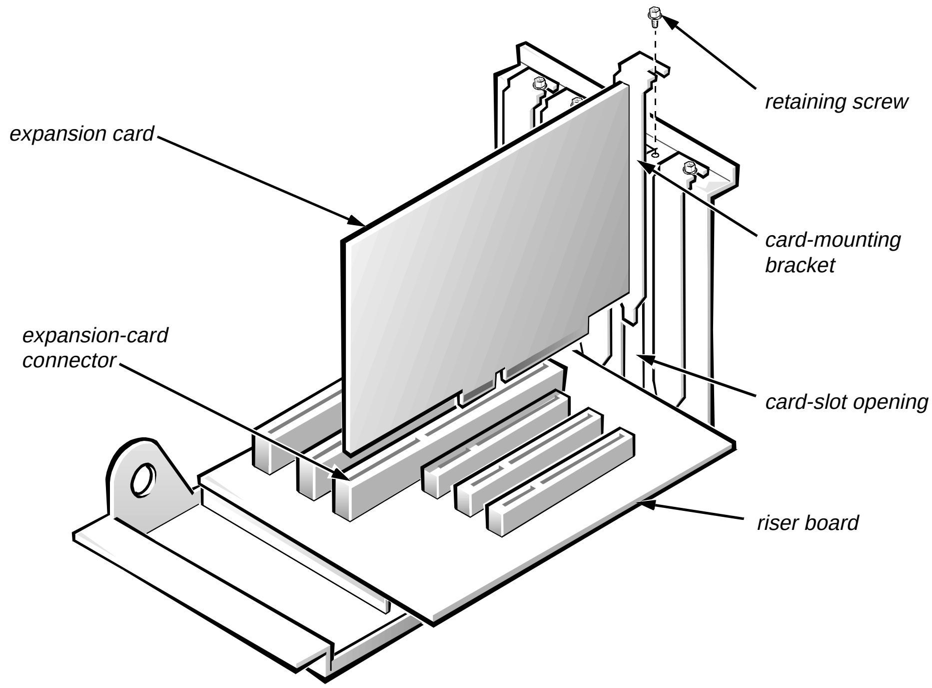


Figure 5-15. Expansion-Card Removal

To remove an expansion card, follow these steps:

1. **Disconnect any cables from the expansion card being removed.**
2. **Remove the expansion-card cage.**
3. **Remove the retaining screw from the card-mounting bracket.**
4. **Grasp the expansion card by its corners, and carefully remove it from the expansion-card connector.**

Riser Board

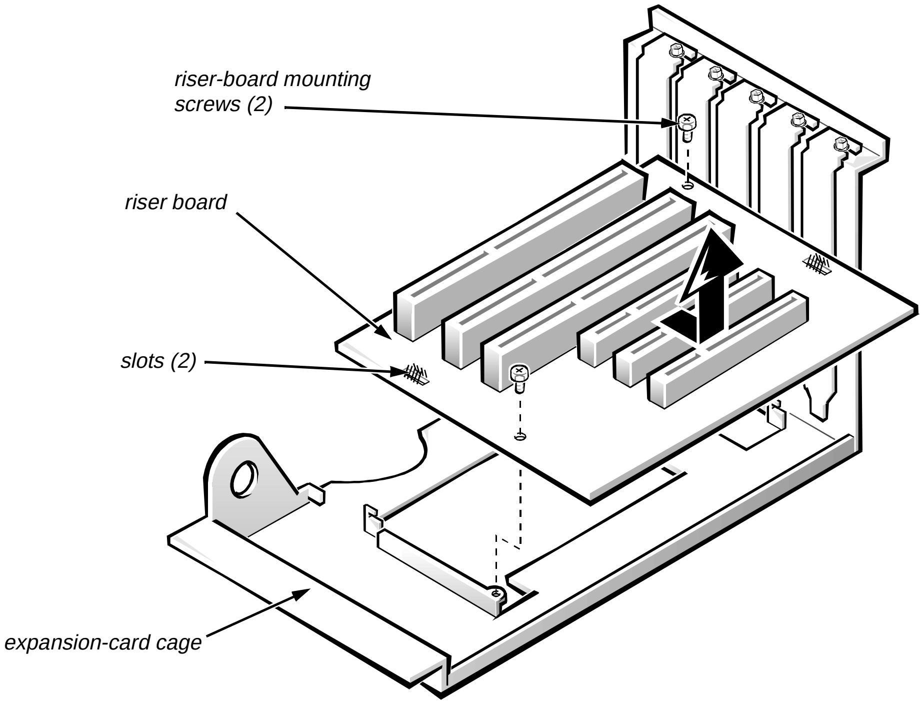


Figure 5-16. Riser Board Removal

To remove the riser board, follow these steps:

1. **Remove the expansion-card cage and all expansion cards.**
2. **On a flat work surface, turn the expansion-card cage over, with the riser board facing up.**
3. **Remove the riser-board mounting screws.**
4. **Slide the riser board down until it stops; then lift the riser board away from the expansion-card cage.**

DIMMs

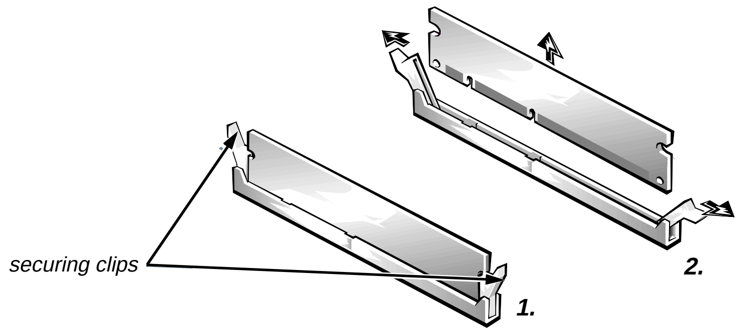


Figure 5-17. DIMM Removal

To remove a DIMM, follow these steps:

1. **Unlatch and rotate the power supply to the right (see Figure 5-12).**
2. **Push outward on the DIMM socket's securing clips until the DIMM is released from its socket.**
3. **Lift the DIMM away from the socket.**

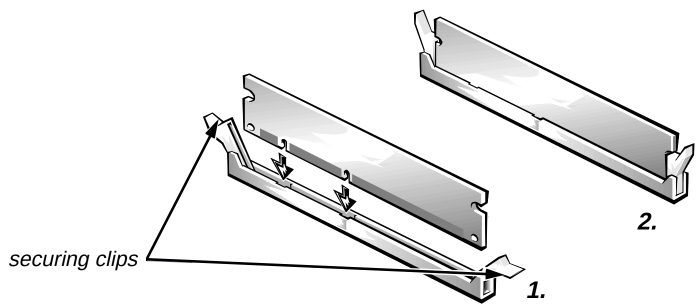


Figure 5-18. DIMM Installation

To replace a DIMM, press the DIMM fully into the socket while closing the securing clips to lock the DIMM into the socket.

Cache Memory Card

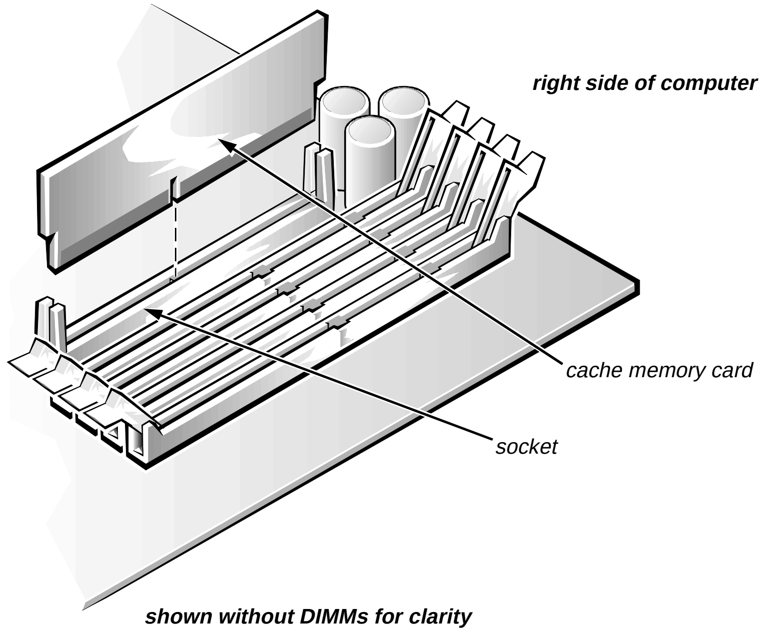


Figure 5-19. Cache-Memory Card Removal

To remove the cache memory card, follow these steps:

1. **Unlatch and rotate the power supply to the right (see Figure 5-12).**
2. **Rock the cache memory card from side to side while pulling up on it.**

   Take note of which end of the cache memory card is the pin-1 end (nearest the right side of the system board).

When you replace the cache memory card, be sure that the pin-1 end of the cache memory card (which has a *1* etched near the connector) is toward the right side of the system board.

NIC Daughter Board

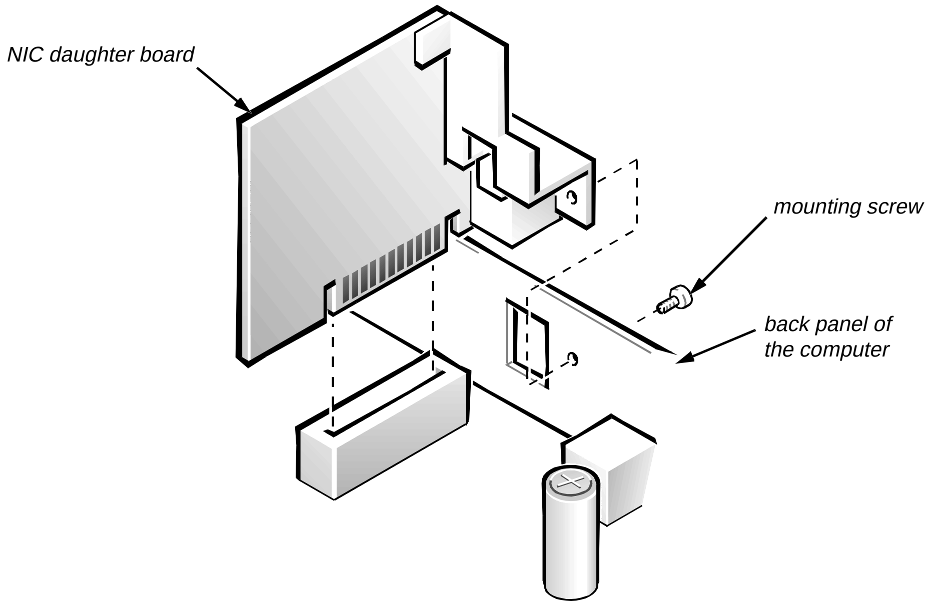


Figure 5-20. NIC Daughter-Board Removal

To remove the NIC daughter board, do the following:

1. **Remove the NIC daughter-board mounting screw.**
2. **Pull up on the NIC daughter board.**

Microprocessor/Heat Sink Assembly

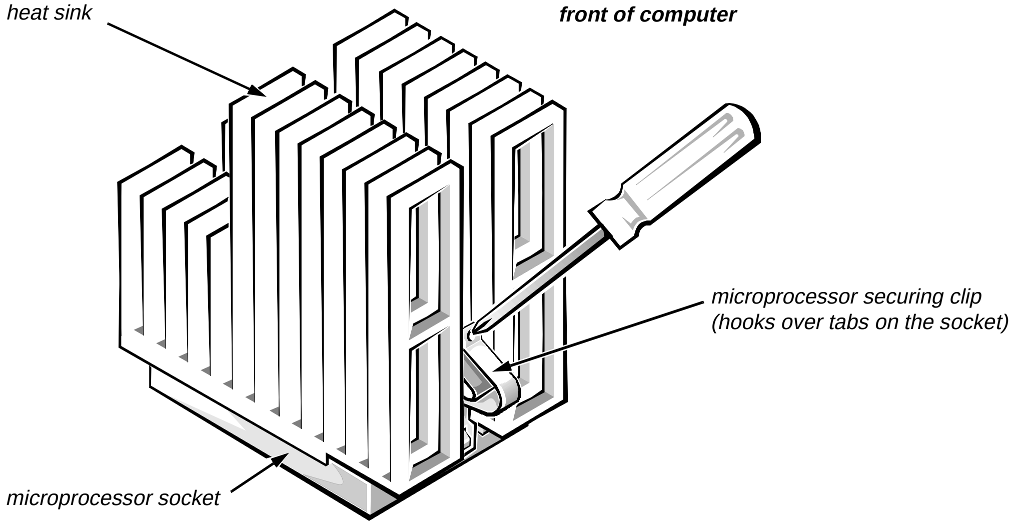


Figure 5-21. Microprocessor Securing-Clip Removal

To remove the microprocessor/heat sink assembly, follow these steps:

1. **Unlatch and rotate the power supply to the right (see Figure 5-12).**
2. **Remove the microprocessor securing clip from the microprocessor/heat sink assembly.**

   WARNING: The microprocessor chip can get extremely hot during system operations. Be sure the chip has had sufficient time to cool before touching it.

   Press down on the folded part of the clip with a small screwdriver to release the clip.

3. **Push outward and then upward on the microprocessor-socket release lever to rotate the lever to its fully vertical position (see Figure 5-22).**
4. **Lift the microprocessor/heat sink assembly out of its socket.**

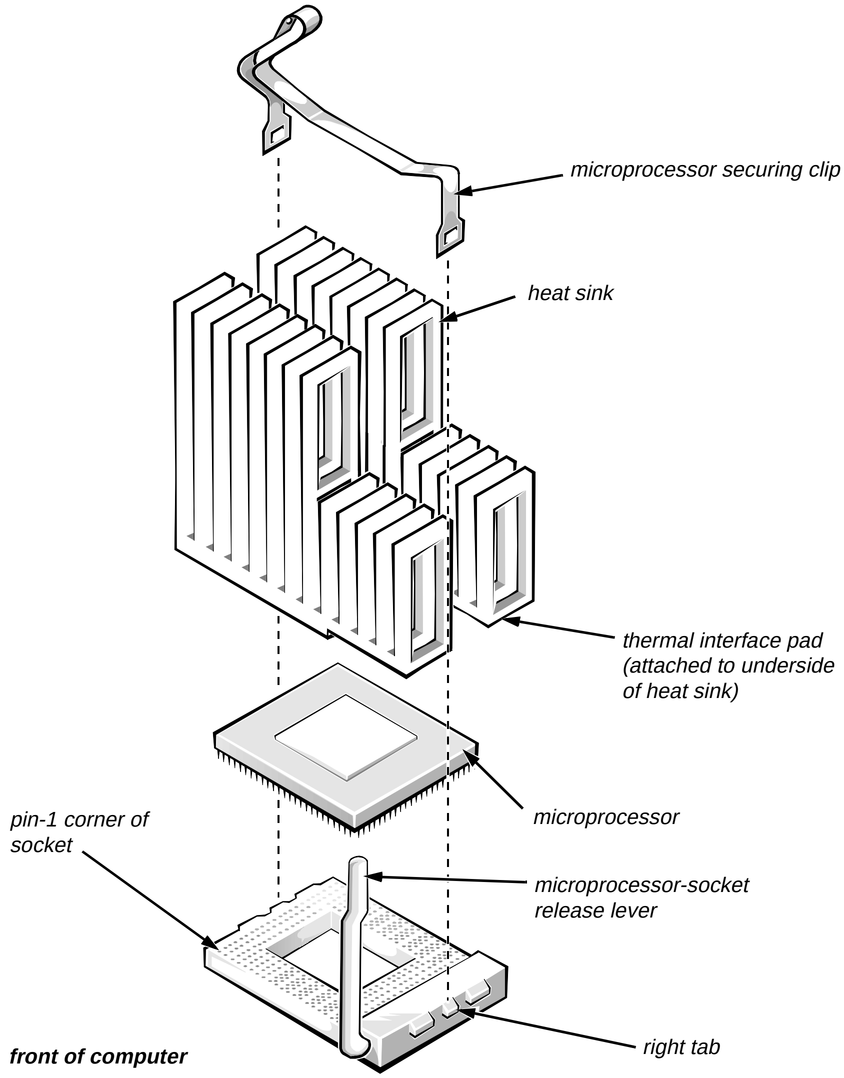


Figure 5-22. Microprocessor Removal

If the heat sink and microprocessor are separate, look at the bottom side of the heat sink, and peel the thermal-pad protective cover off before attaching the heat sink to the microprocessor.

To install the replacement microprocessor/heat sink assembly, ensure that the microprocessor-socket release lever is in its fully vertical position to allow the microprocessor pins to easily slip into the socket. When the microprocessor/ heat sink assembly is in place, rotate the microprocessor-socket release lever to its horizontal position. Hook the microprocessor securing clip over the socket tab nearest the right side of the system board, and then snap it over the tab on the opposite side of the socket.

NOTE: Pin 1 on the microprocessor is located on the corner with the largest bevel. The pin-1 hole in the microprocessor socket is located on the corner where the holes are in a diagonal pattern.

System Battery

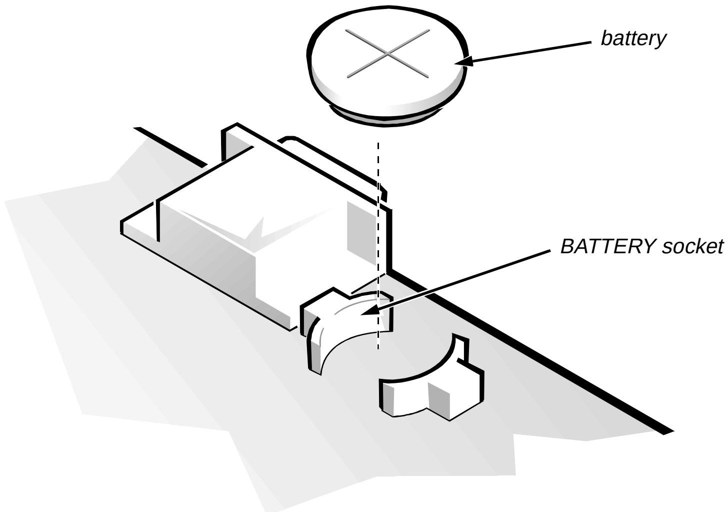


Figure 5-23. System Battery Removal

> **WARNING: There is a danger of the new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.**

To remove the system battery, follow these steps:

1. **If possible, enter the System Setup program, and make a printed copy of the System Setup screens.**
2. **Remove the expansion-card cage.**
3. **Remove the system battery.**

   Carefully pry the system battery out of its socket with your fingers or with a blunt, nonconducting object, such as a plastic screwdriver.

When you replace the system battery, orient the new battery with the "+" facing up. Insert the battery into its socket and snap it into place.

System Board

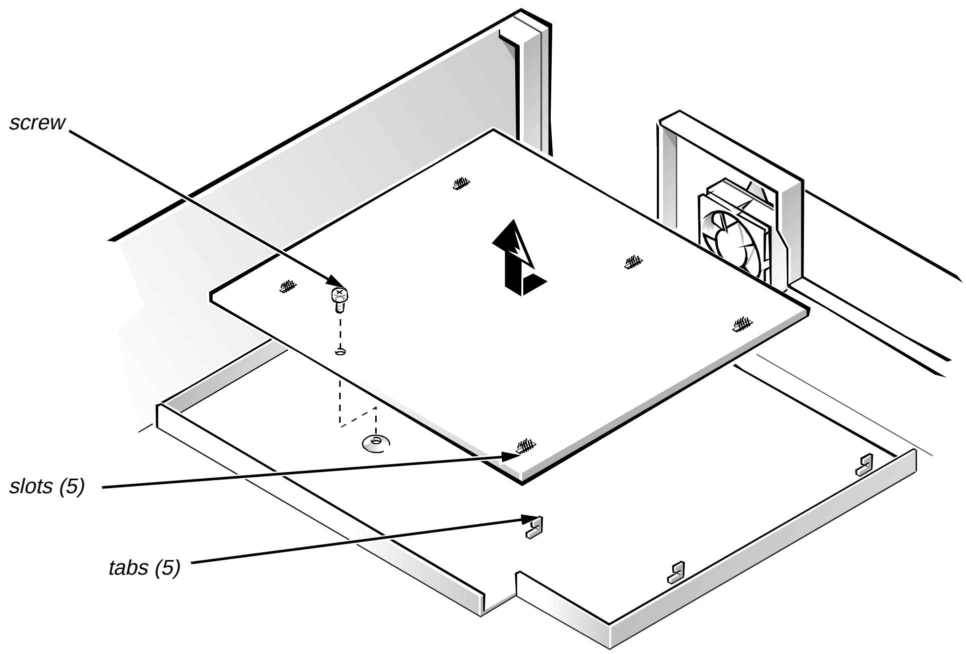


Figure 5-24. System Board Removal

To remove the system board, follow these steps:

1. **Unlatch and rotate the power supply to the right (see Figure 5-12).**
2. **Disconnect all cables from their connectors at the back of the computer.**
3. **Remove the expansion-card cage.**
4. **Disconnect all cables from the system board.**
5. **Remove the screw that secures the system board to the bottom of the chassis.**
6. **Slide the system board toward the front of the chassis until it stops.**
7. **Carefully lift the system board out of the chassis (be sure to lift evenly and not twist the system board).**

If you are replacing a system board, remove the DIMMs, the cache memory card, the NIC daughter board, and the microprocessor from the old system board and install them on the replacement board.

When you reinstall the system board, before you slide the system board back to lock it in position, push down near each slot to engage the grounding clip onto its corresponding tab. Push evenly on both sides of the system board as you slide it into position (do not twist the system board).

Chapter 6
Removing and Replacing Parts on the Mini Tower Chassis

This chapter provides procedures for removing the components, assemblies, and subassemblies in the Dell OptiPlex GXi mini tower computer. If you are servicing a Dell OptiPlex GXi low-profile or midsize computer, use Chapter 4, “Removing and Replacing Parts on the Low-Profile Chassis,” or Chapter 5, “Removing and Replacing Parts on the Midsize Chassis.”

Unless otherwise noted, each procedure assumes the following:

- You have performed the steps in “Precautionary Measures” found later in this chapter.
- You have removed the computer cover.
- You can replace or reinstall a part by performing the removal procedure in reverse order unless additional information is provided.

Recommended Tools

Most of the procedures in this chapter require the use of one or more of the following tools:

- Small flat-blade screwdriver
- Wide flat-blade screwdriver
- #1 and #2 Phillips-head screwdrivers
- 1/4-inch nutdriver
- Tweezers or long-nose pliers

Also, use a wrist grounding strap as explained in the next section, “Precautionary Measures.”

Precautionary Measures

Before you perform any of the procedures in this chapter, take a few moments to read the following warning for your personal safety and to prevent damage to the system from ESD.

WARNING FOR YOUR PERSONAL SAFETY AND PROTECTION OF THE EQUIPMENT: Before you start to work on the system, perform the following steps in the sequence listed.

1. **Turn off the computer and any attached peripherals.**
2. **Disconnect the computer and any attached peripherals from their power sources to reduce the potential for personal injury. Also, disconnect any telephone or telecommunication lines from the computer.**
3. **Wear a wrist grounding strap, and clip it to an unpainted metal surface, such as the padlock loop on the back of the chassis. If a wrist grounding strap is not available, touch any unpainted metal surface on the back of the computer to discharge any static charge from your body.**

Computer Cover

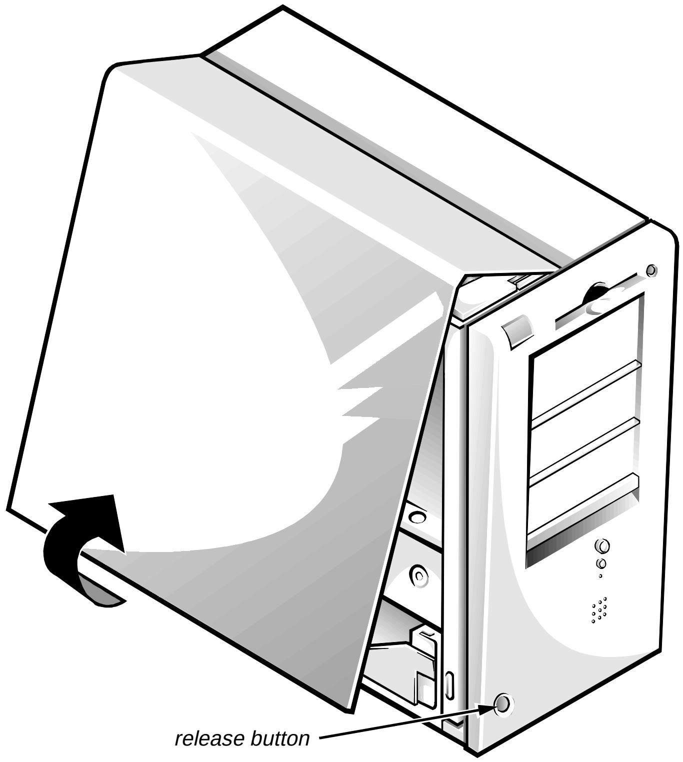


Figure 6-1. Computer Cover Removal

To remove the computer cover, follow these steps:

1. **Remove the padlock if one is installed.**
2. **Facing the left side of the computer, press the release button at the bottom-left corner of the front bezel.**
3. **Lift the bottom of the cover, allowing it to pivot up toward you.**
4. **Disengage the tabs that secure the cover to the top of the chassis, and lift the cover away.**

Before you reinstall the cover, fold all cables out of the way so that they do not interfere with the cover or with the proper airflow inside the computer.

Front Bezel

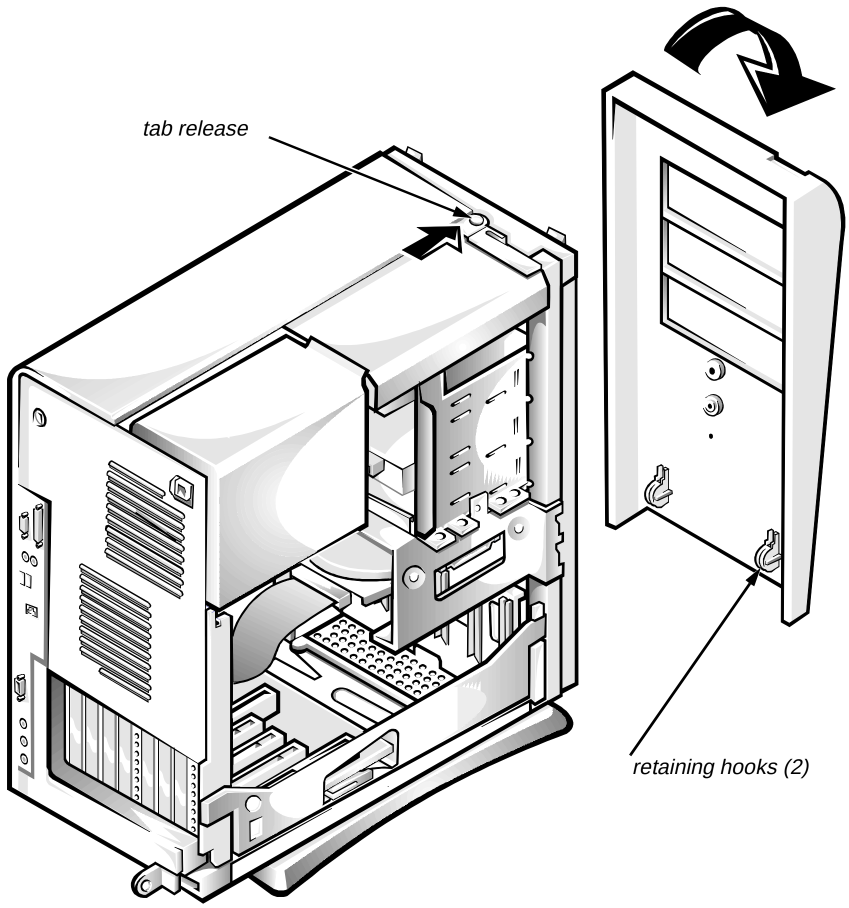


Figure 6-2. Front Bezel Removal

To remove the front bezel, follow these steps:

1. **Press the tab release marked with the icon.**
2. **Tilt the bezel away from the chassis.**
3. **Disengage the two retaining hooks at the bottom of the bezel, and pull the bezel away from the chassis.**

Eject, Power, and Reset Buttons

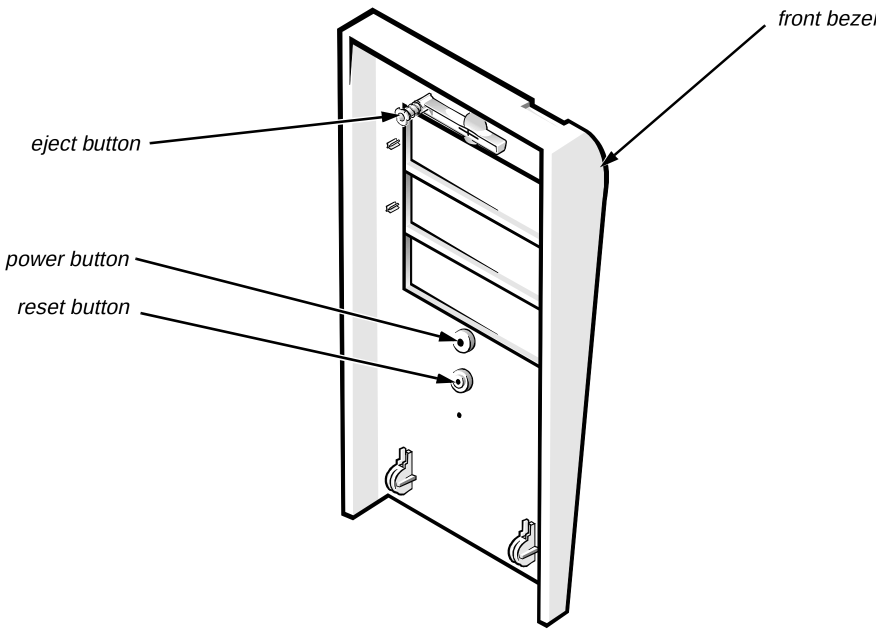


Figure 6-3. Eject, Power, and Reset Button Removal

To remove the eject, power, and reset buttons, follow these steps:

1. **Lay the front bezel on a flat work surface, with the back of the bezel facing up.**
2. **To remove the 3.5-inch diskette-drive eject button, pull gently on the plastic part of the button until it comes free.**
3. **To remove the power button or the reset button, use a small screw-driver and push in on the two or three plastic clips that hold the button to the bezel.**

   When these clips are released, the button comes free from the bezel.

Front-Panel Inserts

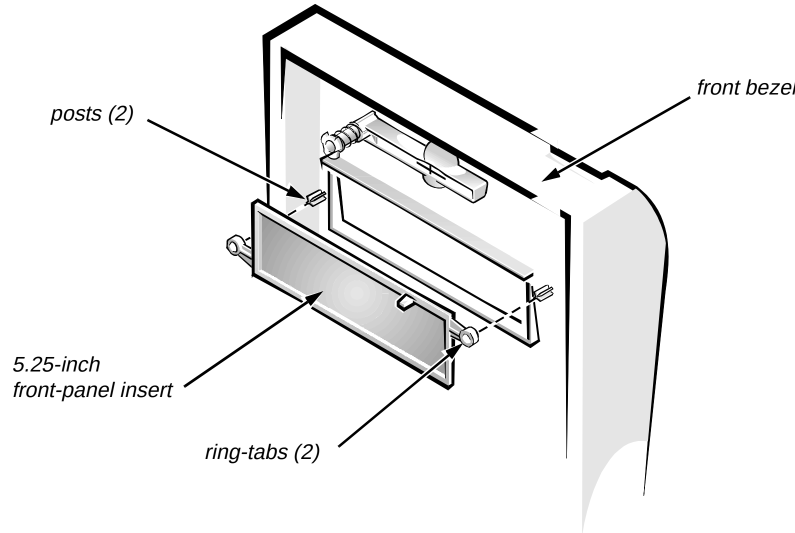


Figure 6-4. 5.25-Inch Front-Panel Insert Removal

To remove a 5.25-inch front-panel insert, follow these steps:

1. **Hold the bezel with the front facing you.**
2. **From the front of the bezel, use your thumbs to press inward on the insert until it slides off the two posts.**

To replace a 5.25-inch front-panel insert, position the two ring-tabs over the posts on the inside of the bay opening, then press the ring tabs over the posts.

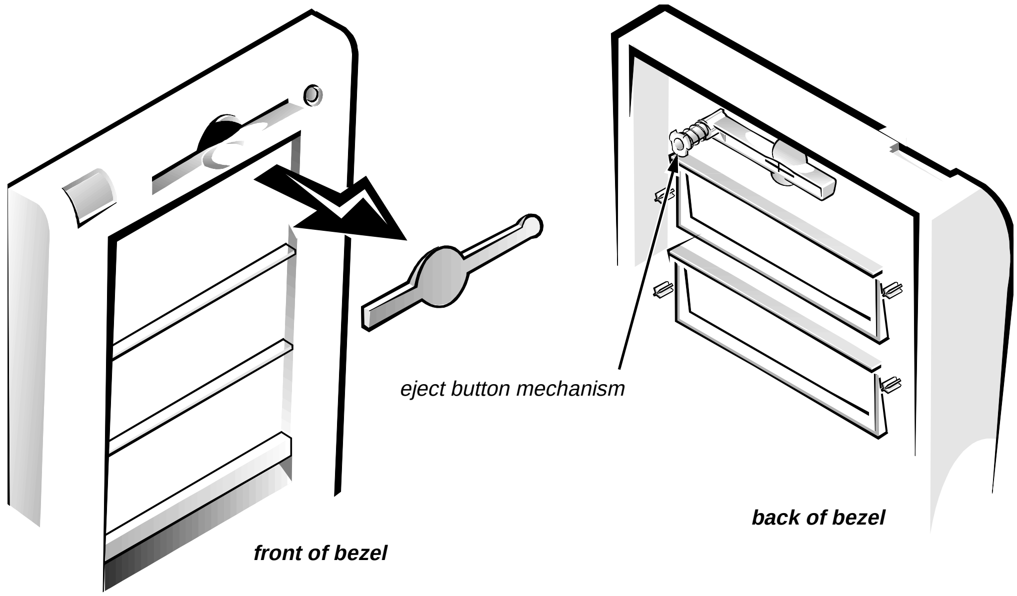


Figure 6-5. 3.5-Inch Front-Panel Insert Removal

To remove a 3.5-inch front-panel insert, follow these steps:

1. **Hold the bezel with the front facing you.**
2. **Inside the bezel, press the eject button mechanism toward the front panel to snap the plastic insert out of its opening.**

To replace the front-panel insert for the 3.5-inch bay, work from outside the bezel. Place the insert in position, and press it into the opening.

Control Panel

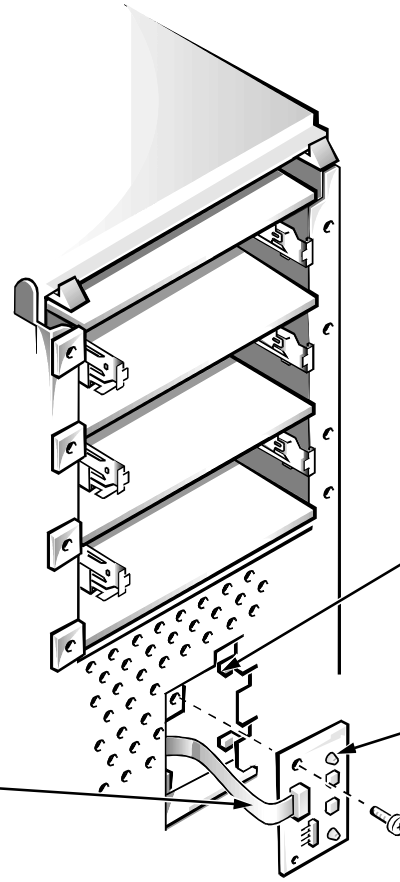


Figure 6-6. Control-Panel Removal

To remove the control panel, follow these steps:

1. **Remove the hard-disk drive bracket.**
2. **Disconnect the control-panel cable from the PANEL connector on the system board (see Figure 6-15).**
3. **Remove the mounting screw holding the control panel to the chassis.**
4. **Slide the control panel out of the hooks holding it to the chassis.**

   Note the routing of the control-panel cable as you remove it from the chassis.

Drives

Figure 6-7 shows an example of drive hardware that can be installed in the computer. Refer to this figure when you perform any of the procedures in the following subsections.

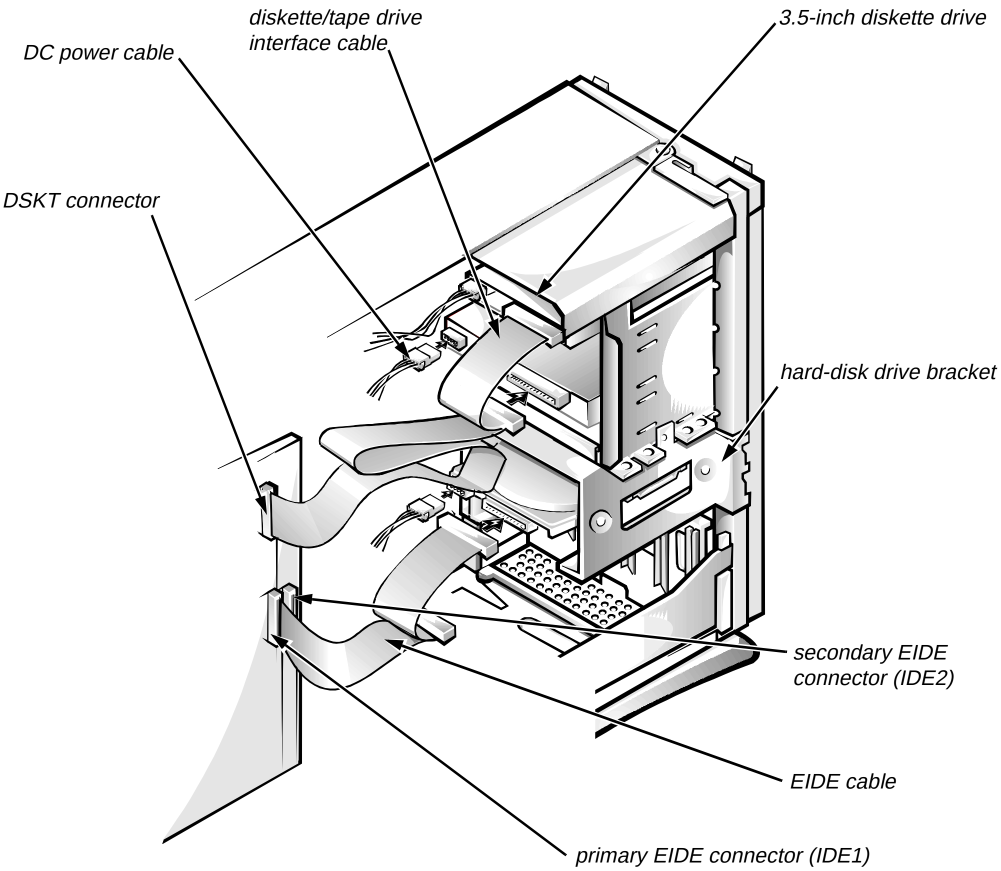


Figure 6-7. Drive Hardware

Externally Accessible Drive Assemblies

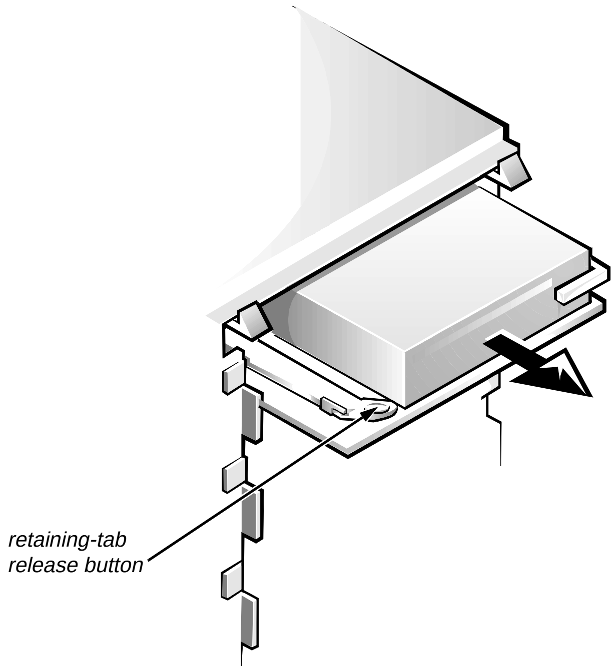


Figure 6-8. 3.5-Inch Drive Assembly Removal

To remove the 3.5-inch diskette drive assembly, follow these steps:

1. **Disconnect the DC power cable and the interface cable from the back of the 3.5-inch diskette drive.**
2. **Press the retaining-tab release button and pull the drive assembly forward to remove it.**
3. **Remove the drive-mounting screw from the left side of the drive, and remove the drive from the bracket (see Figure 6-9).**

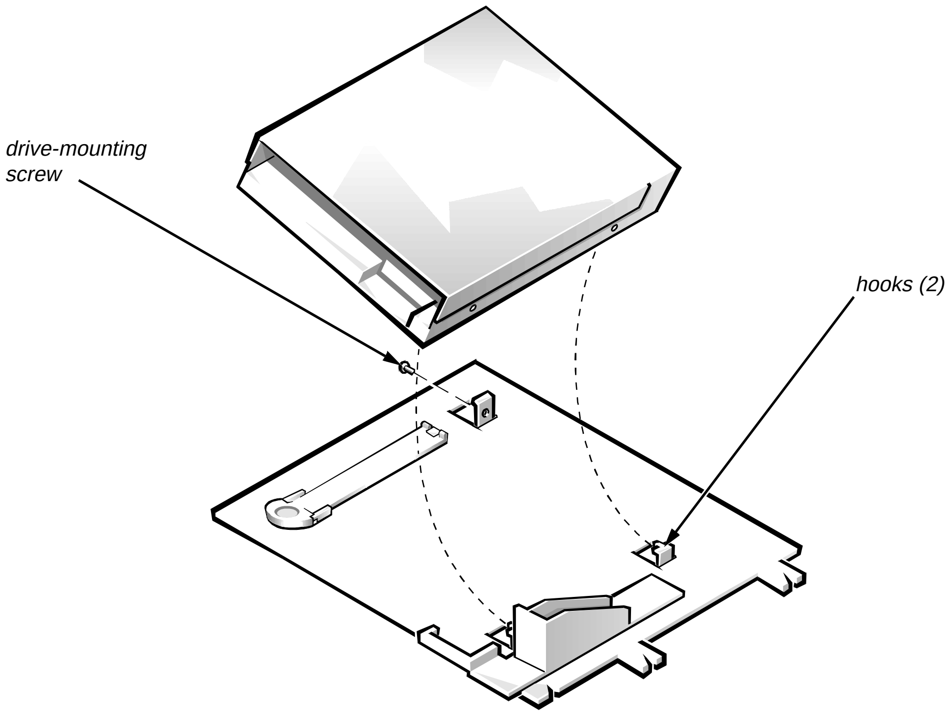


Figure 6-9. 3.5-Inch Diskette Drive Removal

When you replace the 3.5-inch diskette drive, be sure the two hooks on the right side of the bracket engage the mounting holes in the side of the 3.5-inch diskette drive.

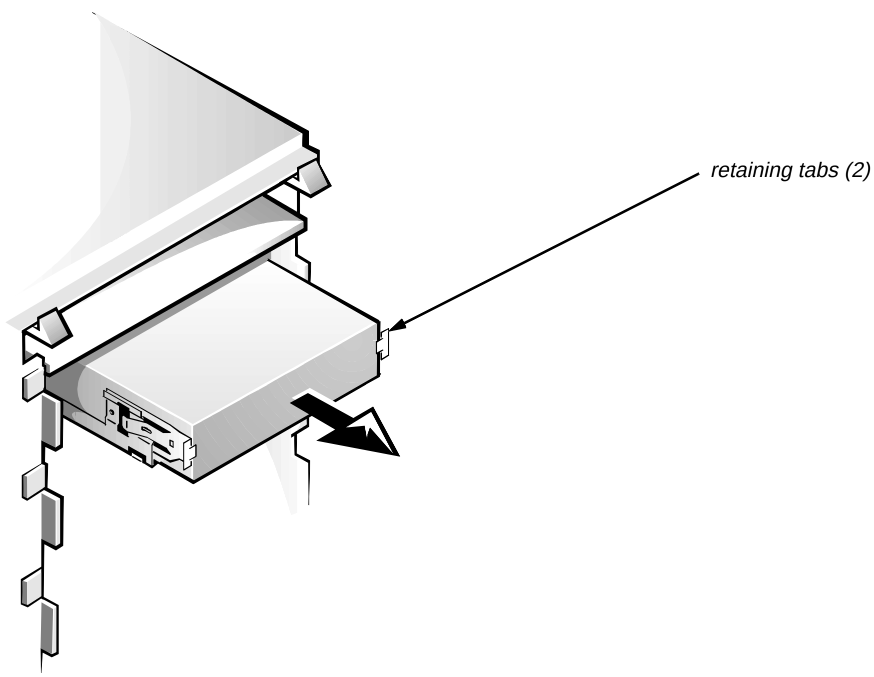


Figure 6-10. 5.25-Inch Drive Assembly Removal

To remove a 5.25-inch drive assembly from the middle or lower drive bay, follow these steps:

1. **Disconnect the DC power cable and the interface cable from the back of the drive.**
2. **Press in on the two retaining tabs (one on each side of the drive), and slide the drive assembly forward to remove it.**
3. **Remove the four screws attaching the 5.25-inch drive to the mounting plate, and lift the drive out of the mounting plate (see Figure 6-11).**

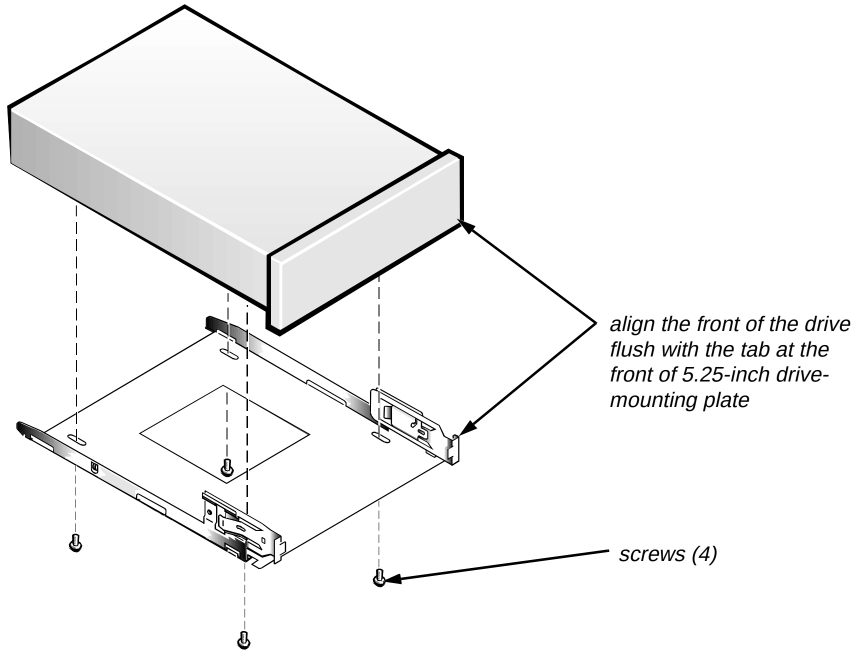


Figure 6-11. 5.25-Inch Drive Removal

When you replace the 5.25-inch drive, align the front of the drive flush with the tab at the front of the mounting plate. Insert the four screws, and tighten them in the order stamped on the bottom of the 5.25-inch drive-mounting plate.

Hard-Disk Drive Bracket

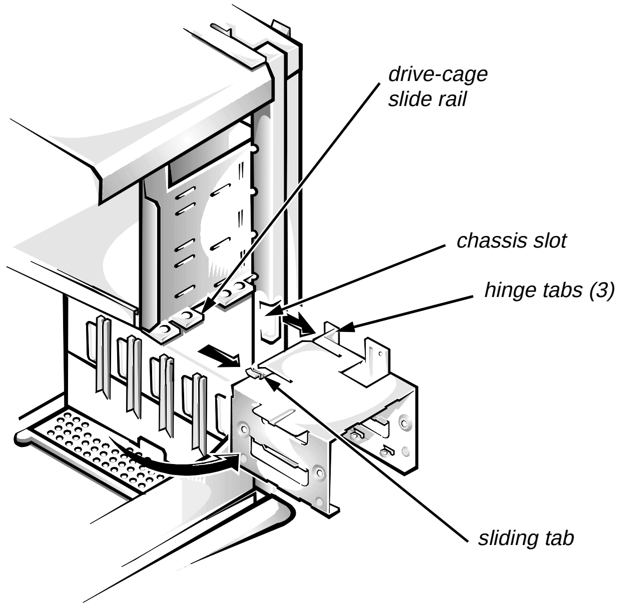


Figure 6-12. Hard-Disk Drive Bracket Removal

To remove the hard-disk drive bracket, follow these steps:

1. **Disconnect the DC power cable and the interface cable from the back of each hard-disk drive installed in the hard-disk drive bracket.**
2. **Remove the screw that secures the hard-disk drive bracket to the drive cage in the chassis.**
3. **Grasp the bracket and rotate it outward from the chassis until the sliding tab clears the slide rail on the drive cage.**
4. **Lift the hard-disk drive bracket up slightly to free the hinge tabs and remove it from the computer.**

When you reinstall the hard-disk drive bracket, insert the bracket's hinge tabs into the chassis slots so that the tabs hook over the slots. Then rotate the bracket toward the drive cage, and fit the bracket's sliding tab on the drive-cage slide rail.

Hard-Disk Drive

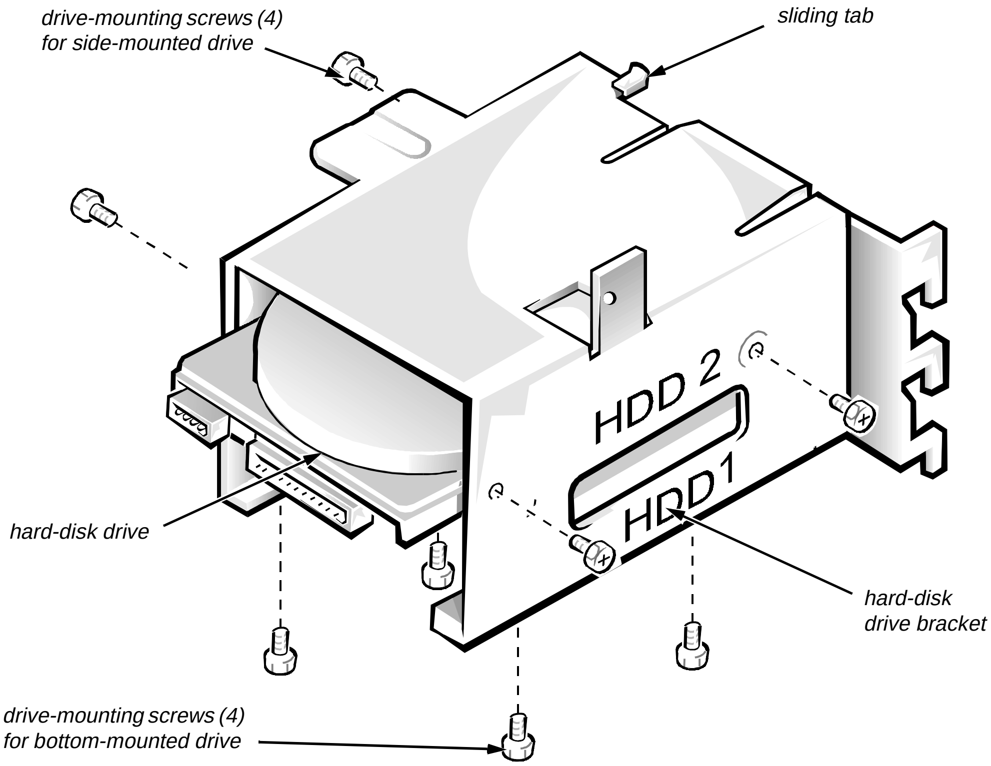


Figure 6-13. Hard-Disk Drive Removal

To remove a hard-disk drive, follow these steps:

1. **Remove the hard-disk drive bracket.**
2. **Remove the four screws that attach the hard-disk drive to the hard-disk drive bracket.**

   One hard-disk drive attaches to the hard-disk drive bracket at the sides of the drive. The other hard-disk drive attaches to the hard-disk drive bracket at the bottom of the hard-disk drive.

3. **Slide the drive out of the hard-disk drive bracket.**

System Power Supply

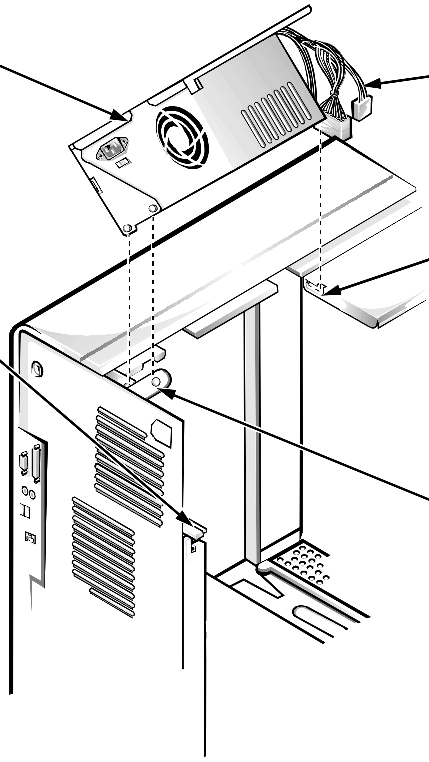


Figure 6-14. System Power-Supply Removal

To remove the system power supply, follow these steps:

1. **Disconnect the AC power cable from the back of the power supply.**
2. **Free the system power supply from the securing tab labeled "RELEASE —>," and rotate it upward until it locks.**

   Press the securing tab to release the power supply.
3. **Disconnect the DC power cables from the system board and the drives.**
4. **Facing the left side of the computer, move the front end of the system power supply toward you, and lift it up to disengage the power supply from the slot in the chassis.**
5. **Lift the system power supply from the computer.**

When you reinstall the power supply, place the power-supply detent link over the pin on the power supply as you position the power supply in the chassis opening.

System Board Components

The subsections that follow Figure 6-15 contain procedures for removing system board components.

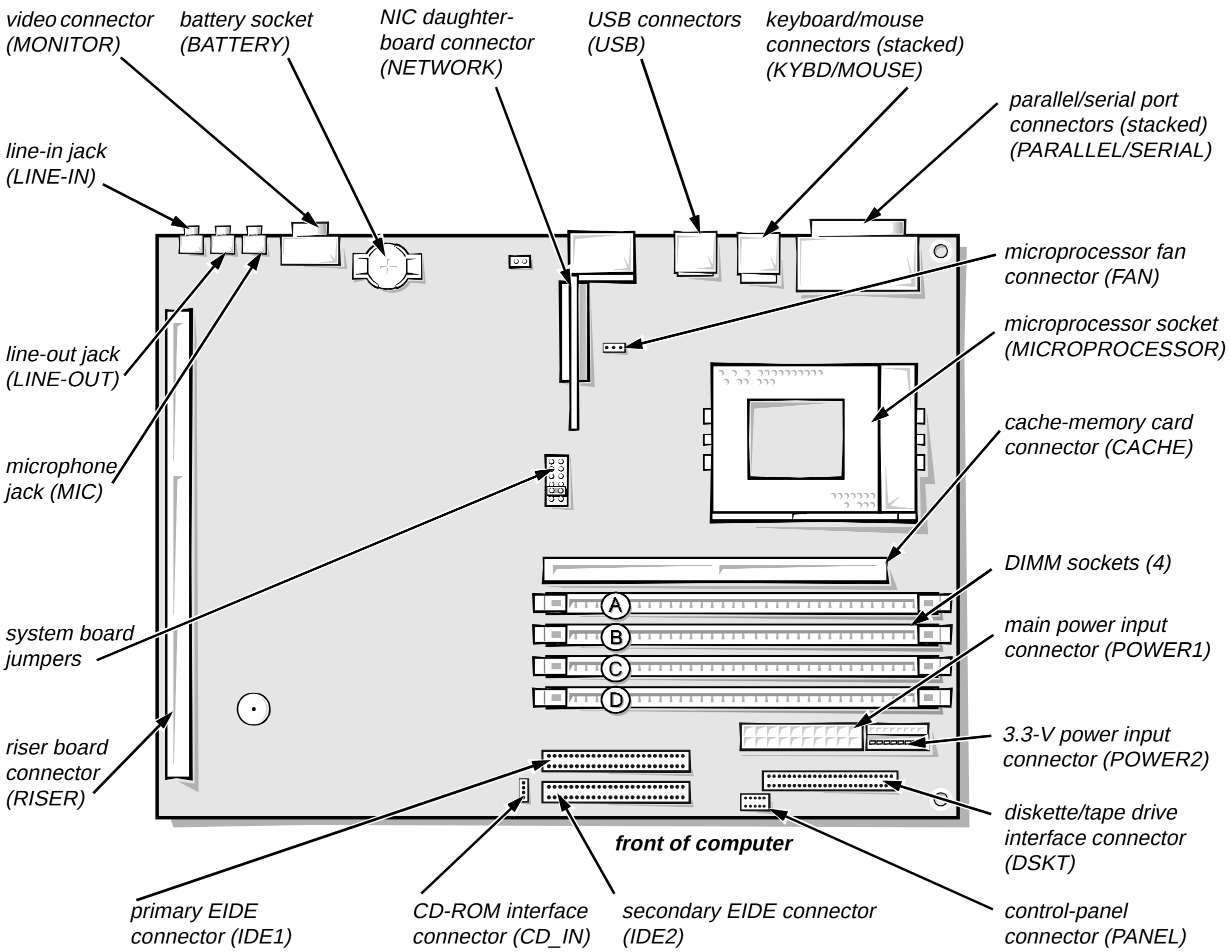


Figure 6-15. System Board Components

Expansion Cards

The computer has a removable expansion-card cage. The expansion-card cage contains the riser board and any installed expansion cards. Dell recommends that you remove the expansion-card cage first before removing or installing expansion cards.

If you are not removing any of the expansion cards, leave the external cables attached to the expansion cards.

Expansion-Card Cage

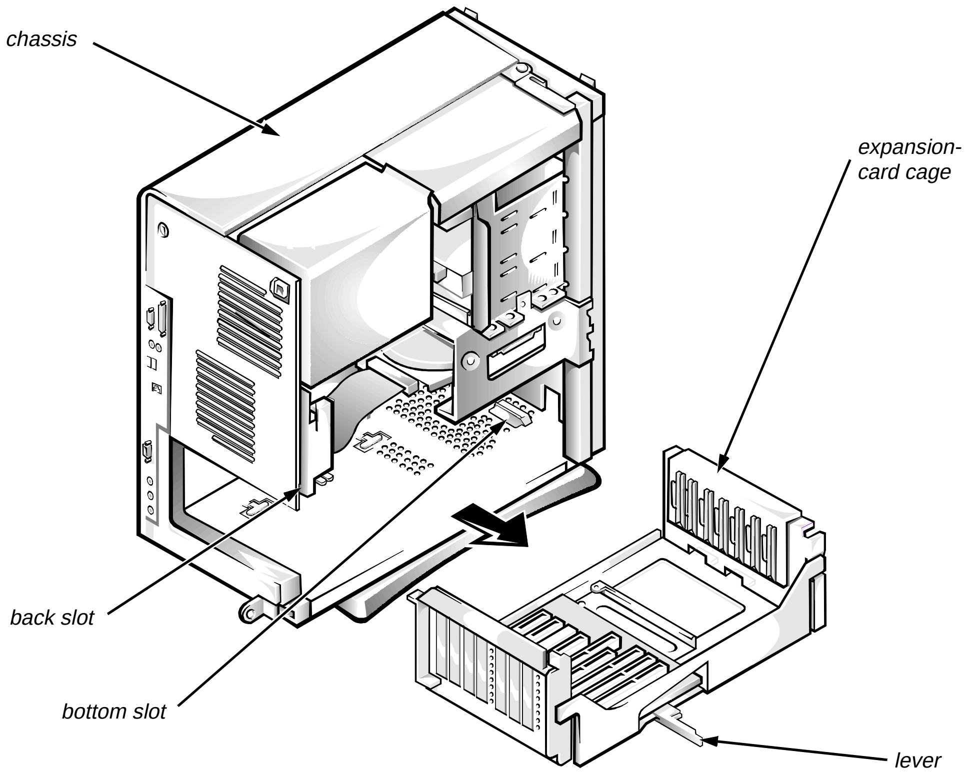


Figure 6-16. Expansion-Card Cage Removal

To remove an expansion-card cage, follow these steps:

1. **Rotate the lever toward the back of the computer until it stops in the upright position.**
2. **Slide the expansion-card cage out of the computer.**

To replace an expansion-card cage, align the tabs on the left and right sides of the expansion-card cage with the slots on the back and bottom of the chassis. With the securing lever in its extended position, slide the expansion-card cage into place.

Expansion Card

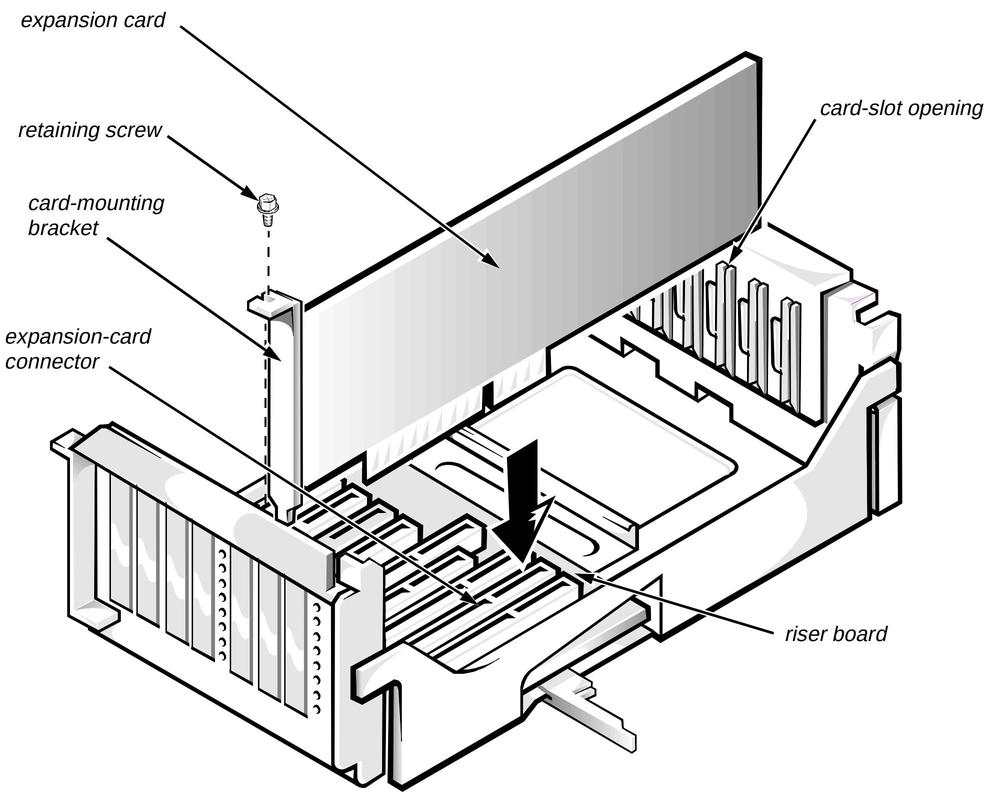


Figure 6-17. Expansion-Card Removal

To remove an expansion card, follow these steps:

1. **Disconnect any cables from the expansion card being removed.**
2. **Remove the expansion-card cage.**
3. **Remove the retaining screw from the card-mounting bracket.**
4. **Grasp the expansion card by its corners, and carefully remove it from the expansion-card connector.**

Riser Board

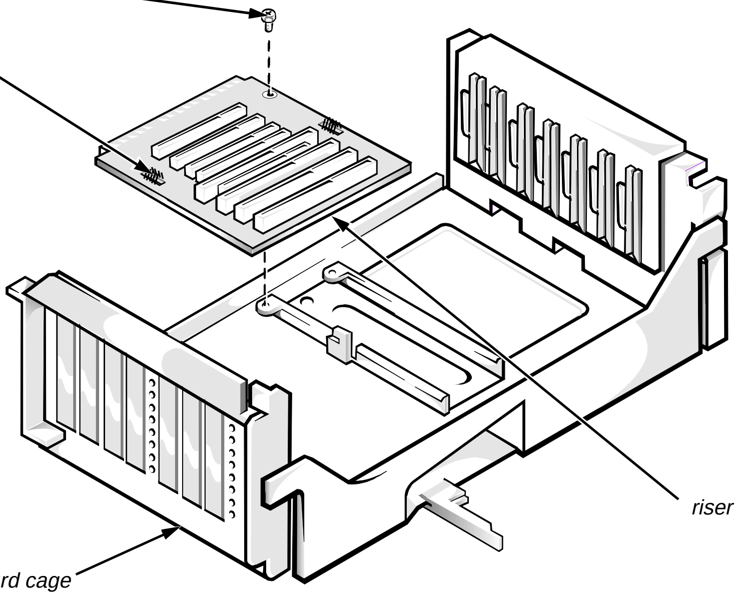


Figure 6-18. Riser Board Removal

To remove the riser board, follow these steps:

1. **Remove the expansion-card cage and all expansion cards.**
2. **Place the expansion-card cage on a flat work surface with the riser board facing up.**
3. **Remove the riser-board mounting screws.**
4. **Slide the riser board away from the release handle until it stops; then lift the riser board away from the expansion-card cage.**

DIMMs

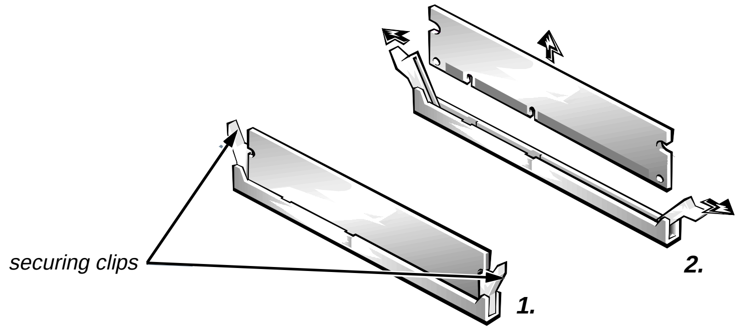


Figure 6-19. DIMM Removal

To remove a DIMM, follow these steps:

1. **Unlatch and rotate the power supply up until it locks (see Figure 6-14).**
2. **Push outward on the DIMM socket's securing clips until the DIMM is released from its socket.**
3. **Lift the DIMM away from the socket.**

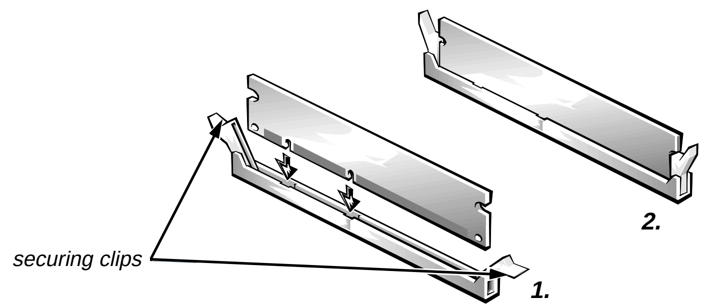


Figure 6-20. DIMM Installation

To replace a DIMM, press the DIMM fully into the socket while closing the securing clips to lock the DIMM into the socket.

Cache Memory Card

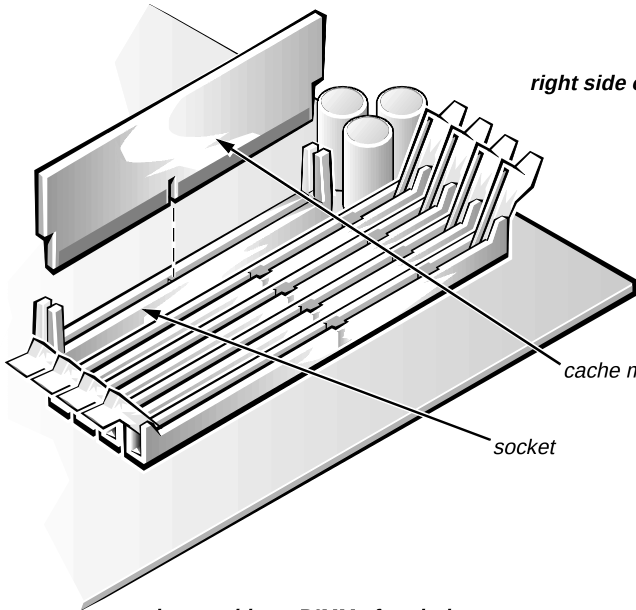


Figure 6-21. Cache-Memory Card Removal

To remove the cache memory card, follow these steps:

1. **Unlatch and rotate the power supply up until it locks (see Figure 6-14).**
2. **Rock the cache memory card from side to side while pulling up on it.**

   Take note of which end of the cache memory card is the pin-1 end (nearest the right side of the system board).

When you replace the cache memory card, be sure that the pin-1 end of the cache memory card (which has a *1* etched near the connector) is toward the right side of the system board.

NIC Daughter Board

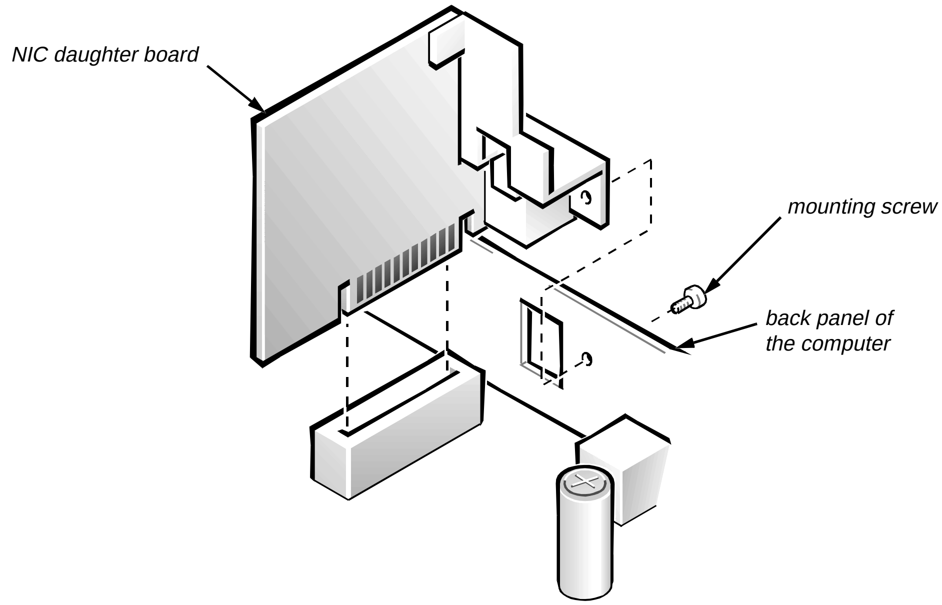


Figure 6-22. NIC Daughter-Board Removal

To remove the NIC daughter board, do the following:

1. **Remove the NIC daughter-board mounting screw.**
2. **Pull up on the NIC daughter board.**

Microprocessor/Heat Sink Assembly

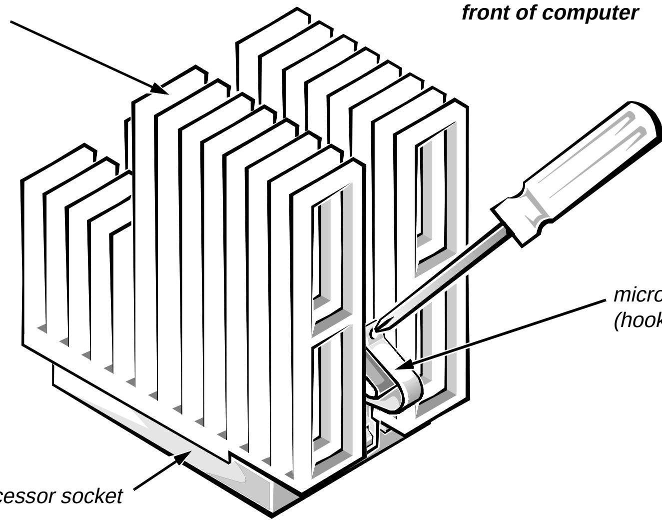


Figure 6-23. Microprocessor Securing-Clip Removal

To remove the microprocessor/heat sink assembly, follow these steps:

1. **Unlatch and rotate the power supply up until it locks (see Figure 6-14).**
2. **Remove the microprocessor securing clip from the microprocessor/heat sink assembly.**

   > **WARNING: The microprocessor chip can get extremely hot during system operations. Be sure the chip has had sufficient time to cool before touching it.**

   Press down on the folded part of the clip with a small screwdriver to release the clip.

3. **Push outward and then upward on the microprocessor-socket release lever to rotate the lever to its fully vertical position (see Figure 6-24).**
4. **Lift the microprocessor/heat sink assembly out of its socket.**

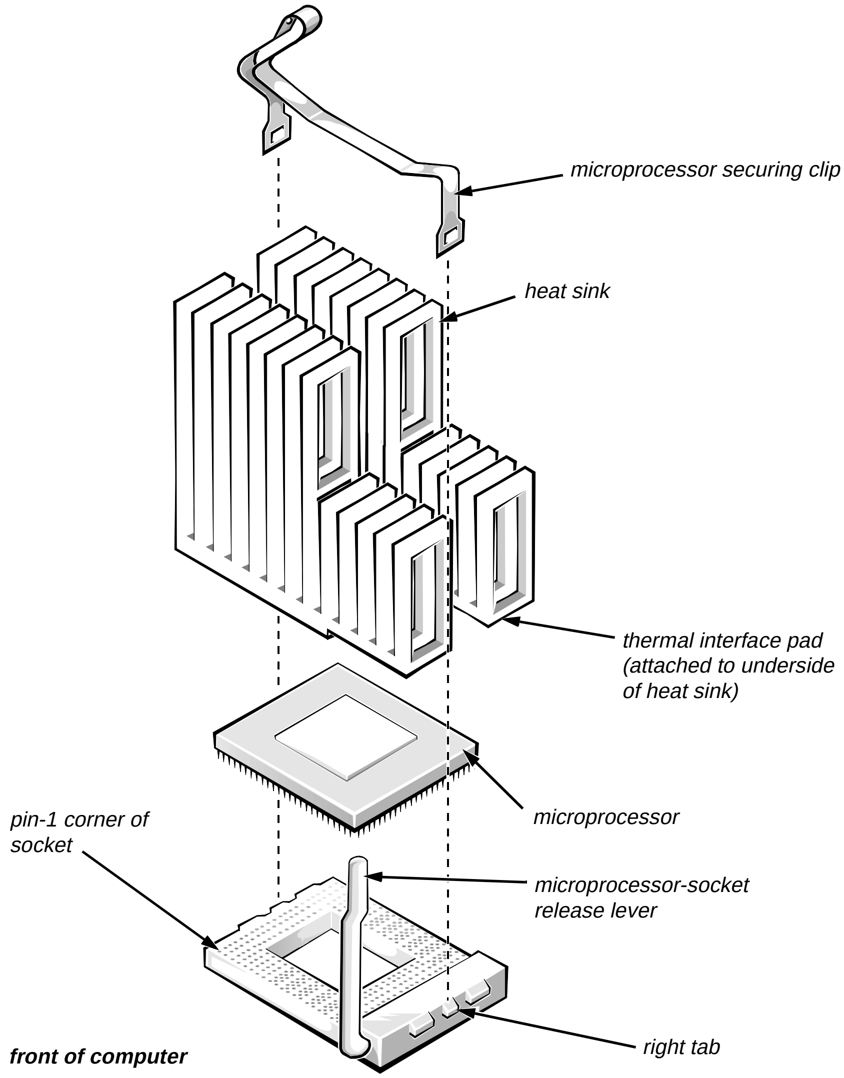


Figure 6-24. Microprocessor Removal

If the heat sink and microprocessor are separate, look at the bottom side of the heat sink, and peel the thermal-pad protective cover off before attaching the heat sink to the microprocessor.

To install the replacement microprocessor/heat sink assembly, ensure that the microprocessor-socket release lever is in its fully vertical position to allow the microprocessor pins to easily slip into the socket. When the microprocessor/ heat sink assembly is in place, rotate the microprocessor-socket release lever to its horizontal position. Hook the microprocessor securing clip over the socket tab nearest the right side of the system board, and then snap it over the tab on the opposite side of the socket.

NOTE: Pin 1 on the microprocessor is located on the corner with the largest bevel. The pin-1 hole in the microprocessor socket is located on the corner where the holes are in a diagonal pattern.

System Battery

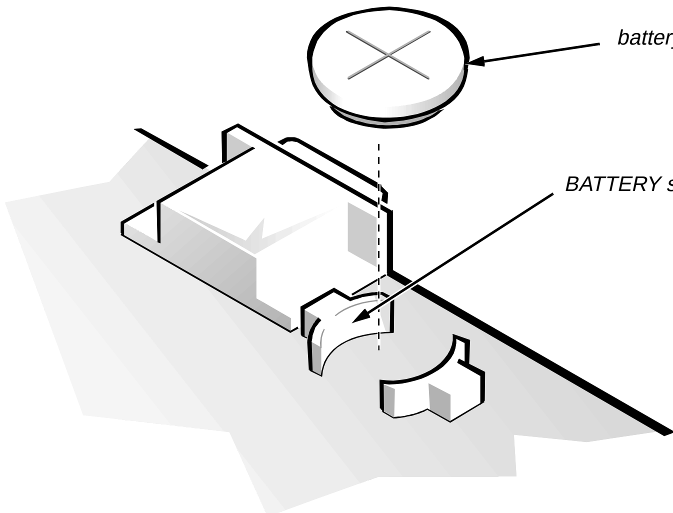


Figure 6-25. System Battery Removal

> **WARNING: There is a danger of the new battery exploding if it is incorrectly installed. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.**

To remove the system battery, follow these steps:

1. **If possible, enter the System Setup program, and make a printed copy of the System Setup screens.**
2. **Remove the expansion-card cage.**
3. **Remove the system battery.**

   Carefully pry the system battery out of its socket with your fingers or with a blunt, nonconducting object, such as a plastic screwdriver.

When you replace the system battery, orient the new battery with the "+" facing up. Insert the battery into its socket and snap it into place.

System Board

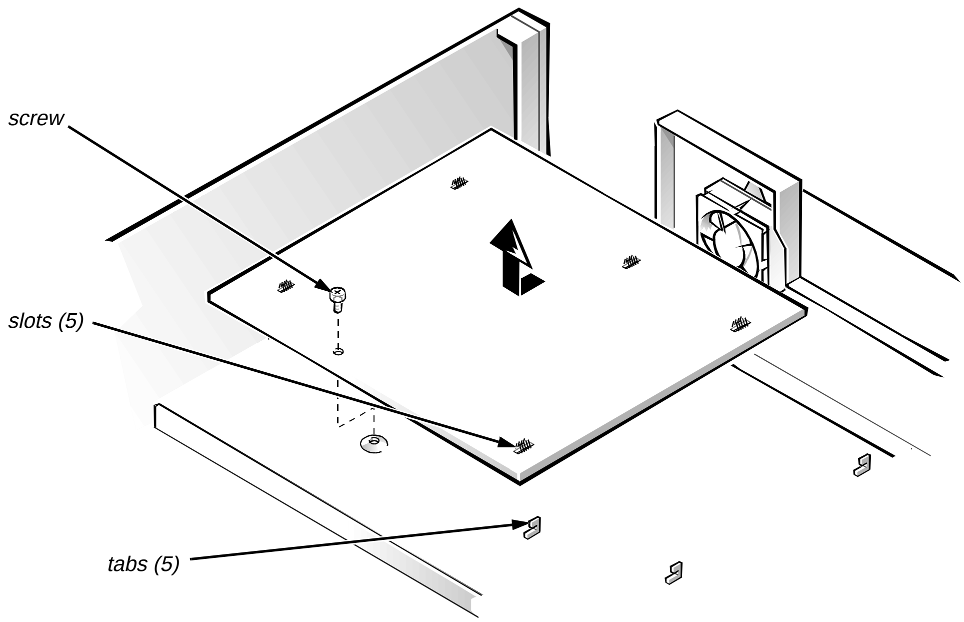


Figure 6-26. System Board Removal

To remove the system board, follow these steps:

1. **Remove the expansion-card cage.**
2. **Place the computer on its side on a flat surface, with the floor stand off the edge of the surface.**
3. **Unlatch and rotate the power supply until it stops (see Figure 6-14).**
4. **Disconnect all cables from their connectors at the back of the computer.**
5. **Disconnect all cables from the system board.**
6. **Remove the screw that secures the system board to the side of the chassis.**
7. **Slide the system board toward the front of the chassis until it stops.**
8. **Carefully lift the system board out of the chassis (be sure to lift evenly and not twist the system board).**

If you are replacing a system board, remove the DIMMs, the cache memory card, the NIC daughter board, and the microprocessor from the old system board and install them on the replacement board.

When you reinstall the system board, before you slide the system board back to lock it in position, push down near each slot to engage the grounding clip onto its corresponding tab. Push evenly on both sides of the system board as you slide it into position (do not twist the system board).

Appendix A
System Setup Program

This appendix describes the System Setup program, which is used to change the system configuration information stored in NVRAM on the system board.

To enter the System Setup program, follow these steps:

1. **Turn on (or reboot) the system.**
2. **Press <Ctrl><Alt><Enter> *immediately* after the computer's speaker emits a beep.**

If you wait too long and the operating system begins to load into memory, *let the system complete the load operation*; then shut down the system and try again.

NOTES: To ensure an orderly system shutdown, consult the documentation that accompanied the operating system.

*If the system is running Microsoft® Windows® 3.1*x *or later, Microsoft Windows 95, or any other protected-mode operating system, do not enter the System Setup program from an MS-DOS window. Enter the System Setup program as described in the previous procedure. Alternatively, from the Windows 95 operating system you can press <F8> when the* `Starting Windows 95` *message appears to get an MS-DOS prompt; then press <Ctrl><Alt><Enter>.*

Another way of entering the System Setup program is to shut down the system, boot from an MS-DOS diskette, and then press <Ctrl><Alt><Enter>. If the system is running MS-DOS, enter the System Setup program from the operating system prompt by pressing <Ctrl><Alt><Enter>.

You can also enter the System Setup program by responding to certain error messages.

System Setup Screens

```
                         Dell Computer Corporation
 Page 1 of 2          System OptiPlex GXi 5200M Setup           BIOS Version: XXX

 Time: [13]:17:02  Date:  Tue. Sept. 22, 1996    | This category sets the time in
                                                  | 24-hour format (hours:minutes:
 Diskette Drive A:     3.5 inch, 1.44 MB          | seconds) for the internal clock/
 Diskette Drive B:       Not Installed            | calendar.
 Drive A Location:            Top                 |
 Drives:                                          | To change the value in a field,
                                                  | enter a number or use the left-
  Primary    Type Cyls Hds  Pre  LZ  Sec  Size    | or right-arrow key.
   Drive 0: Auto  524  32   -1  524  63   540     |
   Drive 1: None                                  |
  Secondary                                       |
   Drive 0: Auto  Packet Interface Device         |
   Drive 1: None                                  |
      Base Memory:            640 KB              |   Microprocessor:  Pentium-200
  Extended Memory:            15 MB               |   External Cache:  256 KB
  Reserved Memory:            None                |     Video Memory:  2 MB
        CPU Speed:            200 MHz             |    System Memory:  16 MB (EDO)
         Num Lock:            On                  |      Service Tag:  XXXXX
                                                  |        Asset Tag:  XXXXX

 Tab,Shift-Tab change fields | ← → change values | Alt-P next | Esc exit | Alt-B reboot
```

```
                         Dell Computer Corporation
 Page 2 of 2          System OptiPlex GXi 5200M Setup           BIOS Version: XXX

      Keyboard Errors:      [   Report   ]        | This category determines whether
      System Password:       Not Enabled          | keyboard-related error messages are
      Password Status:        Unlocked            | reported at system startup.
        Boot Sequence:     Diskette First         |
       Setup Password:       Not Enabled          |
        Auto Power On:     Disabled 00:00         |
     Power Management:        Disabled            |
 ——————————Integrated Devices ——————————          |
                Sound:          On                |
             NIC (TX):          On                |   Microprocessor:  Pentium-200
                Mouse:          On                |   External Cache:  256 KB
          Serial Port:          Auto              |     Video Memory:  2 MB
        Parallel Port:          378h              |    System Memory:  16 MB (EDO)
        Parallel Mode:          AT                |      Service Tag:  XXXXX
            Hard Disk:          Auto              |        Asset Tag:  XXXXX
             Diskette:          Auto              |
                  USB:          Off               |
              Speaker:          On                |
                  ECC:          On                |

 Tab,Shift-Tab change fields | ← → change values | Alt-P next | Esc exit | Alt-B reboot
```

Figure A-1. System Setup Screens

Table A-1. System Setup Categories

Category	Function
Time	Resets time on computer's internal clock.
Date	Resets date on computer's internal calendar.
Diskette Drive A Diskette Drive B	Identifies type of diskette drives installed. Category options always match physical locations of drives in computer. Tape drives are *not* reflected in these categories.
Drive A Location	Identifies which diskette drive is used as the boot drive.
Drives: Primary Secondary	Identifies drives attached to the IDE1 and IDE2 connectors on system board. Each EIDE connector supports two EIDE drives (Drive 0 and Drive 1). For EIDE hard-disk drives, the system provides an automatic drive-type detect feature. To use this feature, highlight the appropriate Drive category and type `a` (for *automatic*). If none of the supported drive types matches the parameters of the new drive, enter parameters directly. To do so, highlight the appropriate Drive category (Drive 0 or Drive 1) and type `u` to display User1. Press <Tab> to highlight each of the parameter fields in succession, and enter the appropriate number for each field. *NOTE: For EIDE devices such as EIDE CD-ROM drives and EIDE tape drives that are using the built-in EIDE controller, set the appropriate Drive category to Auto.*
Base Memory	Displays amount of memory available to MS-DOS programs that do not use extended or expanded memory.
Extended Memory	Displays amount of memory available as extended memory.
Reserved Memory	Designates a region of system board memory that can be supplied by an expansion card. This feature should not be enabled unless an expansion card that requires special addressing is installed.

Table A-1. System Setup Categories *(continued)*

Category	Function
CPU Speed	Indicates processor speed at which system boots — the processor’s rated speed or a slower compatibility speed.
Num Lock	Determines whether keyboard’s Num Lock mode is activated.
Keyboard Errors	Enables or disables reporting of keyboard errors during POST.
System Password	Displays current status of system’s password security feature. Also used to assign and verify a new password.
Password Status	Provides an extra measure of system security by letting you set the system password to Locked or Unlocked.
Boot Sequence	Determines whether system boots from diskette (if present) or hard-disk drive.
Setup Password	Restricts access to System Setup program.
Auto Power On	Allows you to set the day and time you want the system to power on automatically. The time uses the 24-hour format.
Power Management	With the Power Management category enabled, DPMS monitors and most EIDE drives automatically switch into low-power mode during periods of system inactivity. **CAUTION: Before enabling this feature, check the monitor documentation to make sure the system has a DPMS-compliant monitor. Otherwise, there is a risk of damaging the monitor.** *NOTE: Not all EIDE hard-disk drives support this feature. Enabling this feature for drives that do not support it may cause the EIDE drive to become inoperable until the system is restarted and the Power Management category is disabled.*
Sound	Enables (On) or disables (Off) the integrated sound controller.
NIC (TX)	Enables (On) or disables (Off) the NIC.
Mouse	Enables or disables the built-in PS/2-compatible mouse port.

Table A-1. System Setup Categories *(continued)*

Category	Function
Serial Port	Configures system's built-in serial port.
Parallel Port	Configures system's built-in parallel port. The port's I/O address may be set to 278h, 3BCh, or 378h. Otherwise, the port may be disabled.
Parallel Mode	Controls whether system's built-in parallel port acts as an AT-compatible (unidirectional) or PS/2-compatible (bidirectional) port.
Hard Disk	Enables system's built-in EIDE hard-disk drive interface.
Diskette	Enables system's built-in diskette drive controller.
USB	Enables (On) or disables (Off) the USB connectors.
Speaker	Enables on-board speaker.
ECC	Enables (On) or disables (Off) the error correction capability of the memory controller. *NOTE: This field is displayed only when 72-bit EDO (ECC) DIMMs are installed.*
Microprocessor	Displays type of microprocessor installed.
External Cache	Displays size of external cache memory card installed.
Video Memory	Displays amount of video memory on the system board.
System Memory	Displays entire amount of installed memory detected in system, except for memory on EMS expansion cards. If EDO DIMMs are installed, EDO is displayed next to this category.
Service Tag	Displays system's five-character service tag number.
Asset Tag	Displays the asset tag number up to ten characters if one is assigned.

Index

Numbers

A

B

C

D

P

R

S

T

V

www.dell.com

Printed in the U.S.A.

P/N 50560   Rev. A01